THE IRON AGE

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Scientific Management in a Foundry

Interesting System Adopted by the Aluminum Castings Company, Which with Bonus Wage Payments Has Resulted in Remarkable Cutting of Costs

Scientific management has been adopted in many machine shops, but the principles and methods that appear to have proved successful in various other metal working lines have in but a few cases been applied to any great extent to the management of the foundry. An example of the operation of the foundry along modern lines of scientific management worked out in the completest detail is found in the plant of the Aluminum Castings Company, Detroit, Mich., maker of aluminum, brass and bronze castings.

About two years ago this company decided to effect an entire reorganization of its shop system and this work was placed in the hands of F. A. Parkhurst, who became connected with the company as organizing engineer. Shortly before he became associated with this company he had completed the work of installing scientific management in the plant of the Ferracute Machine Company, Bridgeton, N. J., and the scientific methods that have been applied to the Detroit plant of the Aluminum Castings Company are similar in general principles to those adopted in the Ferracute plant. They differ only in detail in the routine application. The theory on which the system was installed is that if scientific management is a good thing for a machine shop it should be equally advantageous for a foundry. Conditions and processes in foundries are so generally similar that the system in effect in the Detroit plant could be applied to an iron foundry with very little modification of detail to make it conform with the differences in manufacturing methods and shop practices.

One of the most interesting features of the plant management is the bonus wage system, and in connection with it the standardization and classification of work so that standard bonus charts are provided for practically every combination of light work in the foundry. Now that these standard operation times for the numerous operations have

Fig. 1.—Method Used for Preventing Duplication When Assigning Numbers to Bonus Charts

BONUS CHART — FORM FAP 117 — THE ALUMINUM CASTINGS CO.

NOTE—THE FOLLOWING PRICES WILL BE PAID AS BONUS IN ADDITION TO HOURLY WAGES BASED ON GOOD PIECES WHICH PASS INSPECTION AFTER THIS SPECIFIC OPERATION, EXCEPT THAT DEFECTIVE NOT DUE TO WORK SPECIFIED ON THIS CHART WILL NOT BE DEDUCTED IN PAYING BONUS.
THESE BONUS PRICES WILL NOT BE LOWERED NO MATTER HOW LONG THE JOB MAY RUN WITH THIS PATTERN, CORE BOXES EQUIPMENT AND BY THE METHOD AND DESIGN SPECIFIED IN THE INSTRUCTION REFERRED TO AND WITH THE NUMBER OF OPERATIVES MENTIONED BELOW

OPERATION Molding
SYMBOL 3268
CUSTOMER John Doe
EQUIPMENT Running drag on floor. Cope on wheel truck.

BONUS CHART 3558D
SHEETS, SHEET
DATE July 26th 1914
INSTRUCTION NO.

Differential Class 5 .045
" " 7 .063

OPERATIVES AND CLASS NO. 2 Molders Class 7 and 5 Helpers Class 5

Good Castgs Per day	Bonus Class5	Bonus Class7
35	$.575	$.805
36	.620	.868
37	.665	.931
38	.710	.994
39	.755	1.057
40	.800	1.120
41	.845	1.183
42	.890	1.246
43	.935	1.309
44	.980	1.372
45	1.025	1.435
46	1.070	1.498
47	1.115	1.561
48	1.160	1.624
49	1.205	1.687
50	1.250	1.750

Fig. 2.—Typical Bonus Chart for Molding Work

been computed, only a small amount of additional time study work is required.

The bonus wage system is in use in few foundries, the general practice being to pay the men piece rate or an hourly wage rate. Under the bonus system the men are paid the ruling hourly wages that prevail in other plants in the vicinity and in addition are also paid the bonus. With the hour rate there is no incentive of the molder to do his best and the piece rate system is claimed to have certain features that are disadvantageous to both the employer and employee. It is claimed that it is harder to maintain discipline when men are working on piece work than if they are employed to do a certain number hours work per day, and that a man depending on the piece rate alone will often be unable to earn satisfactory wages for the first day or two when working on a new job.

The system has been in operation long enough to assure the management of tangible results. It has occasioned an increase in office employees and salaries for carrying out the details, but it is claimed that the additional overhead burden has been far more than offset by economies that have been effected by increased production. With greater efficiency of workmen, the output can be materially

TIME STUDY — Form FAP 111 — THE ALUMINUM CASTINGS CO.

TIME STUDY NO. ..... SHEETS. SHEET .....
ARTICLE ..... PIECE SYMBOL .....
SKETCH OR DRAWING ..... QUANTITY ..... OPERATION .....
MAN NO. ..... MACH. NO. ..... DEPT. ..... WORK JOB OR ORDER NO. .....
TIME ..... A. M., P. M.
MATERIAL ..... OBSERVER ..... DATE ..... 19..

NOTE—The observer must exercise extreme care in making time studies to see that the proper sequence of operation is maintained, that all unnecessary operations or movies are eliminated, that proper appliances are provided and if machine work see that the proper and most economical combinations of Speed, Feed and Cut are used. When time is slow, due to man's natural slow moves, note (in margin at extreme right below) what time should be for a fast man moving at his best normal speed. Have certain operations repeated if necessary to satisfy yourself that the time is correct and continue to do so until the study is satisfactory.

Sub-Operation	DETAIL DESCRIPTION OF OPERATIONS SPEED, CUTS, ETC.	MINUTES AND HUNDREDTHS 1	2	3	AVERAGE	SHOULD TAKE
1						
2						
3						
29						
30						
	TOTALS (OR CARRIED FORWARD)					

FINISHED ..... A. M. / P. M. ELAPSED TIME FOR ..... MIN.

Fig. 3.—The Blank for Recording Time Studies

increased, so that for a given maximum output smaller plant capacity is required than if the efficiency were lacking, and consequently less capital need be tied up in buildings and equipment. As regards the employees, the company's records show that they are earning more than under the hour wage formerly in use and that they appear well pleased with the bonus system. A tour throughout the plant impresses one that the men are working for production instead of trying to do only a moderate day's work or perhaps putting in their time with as little work as possible.

PLANT ORGANIZATION

The four executive and administrative heads connected with the general offices are the president, vice-president, general manager and general superintendent, who is also the organizing engineer. The general offices are located in Cleveland, but as the Detroit plant is the largest one operated by the company the organizing engineer has made his headquarters at the Detroit plant, spending a portion of the time in Cleveland. Other foundries are owned by the company in Buffalo, N. Y., Fairfield, Conn., and Manitowoc, Wis. After the details of management have been worked out and put into effect in the Detroit plant and the forms and methods standardized, they are adopted in the other plants. The standardization of the system has made its adoption in the other plants rather a simple matter, as the bonus charts and other data worked out in one foundry are equally adaptable to the others.

Fig. 1—Finishing Molds and Pouring Transmission Case Castings, Showing How Work on the Foundry Floor Is Specialized

Each plant has a local manager and assistant manager, superintendent and assistant superintendent. The local manager pays particular attention to the business routine and has general control of purchases through the general purchasing agent and charge of sales in the immediate territory. All operating departments are under the plant superintendent, who is directly over the core and molding superintendents in those two departments, but who deals with the various miscellaneous departments through the planning room, which is one of the most important parts of the organization and of which he is the nominal head. The functions of the planning room are to analyze orders and arrange delivery dates, route work through the shops, control the order of work, control the balance of labor, and adopt standard times for various jobs by means of time study data; schedule work in the process of manufacture, have charge of stores, including the requisition and distribution of the stock; analyze costs and exercise chief inspection. Not only is the planning room able to predetermine delivery dates, but to a certain extent it predetermines cost.

The working force in the planning room includes a production clerk, route clerk, order of work clerk, time study foreman, schedule clerk, two cost clerks, stores clerk and chief inspector. Within the organization there is a factory board, which is composed of the assistant general superintendent, local plant superintendent, production clerk, order of work clerk, assistant order of work clerk and time study foreman. This local plant board meets every afternoon, except Saturday, at 1 o'clock and takes up many of the plant production details, including general planning, fixing of delivery dates, the consideration of any special technical matters or orders for special castings. This board also goes over the plant costs for the day before.

BONUS WAGE SYSTEM

In applying the bonus wage system, operations are divided into eight classes, according to the character of work and skill required. The amount of bonus paid gradually increases from Class No. 1 which includes unskilled laborers up to Class No. 8, which takes in the most skilled workmen. The

bonus paid in addition to the wage rate for laborers who are in Class 1 for the scheduled maximum output is 25 cents per day. As illustration of the classification of workmen, Class 2 includes men who knock out cores, knock off gates and risers and do some core work. In the highest class, Class 8, are men who do complicated bench or floor molding work, for which the bonus for the predetermined maximum output is $2 per day. The time required for making a certain mold, for example, is determined by time studies and a maximum daily output (in good castings) is scheduled for production of that mold. The payments of the bonus start with a production of 80 per cent. of the maximum and the bonus increases in the same proportion as the increase in production. If an employee is able to exceed what has been figured out to be the maximum production he is paid a bonus at the same differential rate for the number of pieces above the maximum.

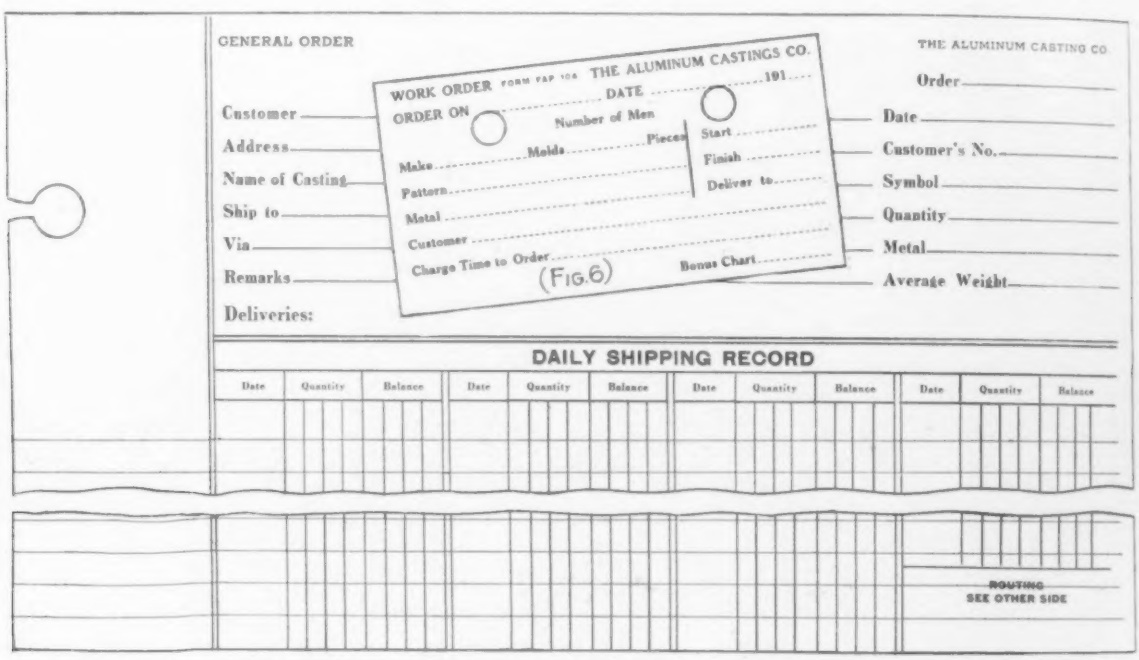


Fig. 5—The Order Which Goes to the Planning Department from the Sales Department and One of the Work Orders, Fig 6, Made Out by the Route Clerk

The bonus for each class of workman is computed in the following manner: Assume that the maximum production per day is 85 castings and the maximum bonus rate is $2 per day. In computing the premium payments 50 per cent. of the maximum production is taken as a basis, although no bonus is paid for less than 80 per cent. of production. Fifty per cent. of 85 castings is 44½, or say 45. Ten per cent. is deducted from the maximum bonus of $2, leaving $1.80, which is divided by the number that represents 50 per cent. of the maximum output, in this case being 45, and the quotient is 4 cents. The 10 per cent. deducted from the $2 is added to this quotient, making 4.4 cents, the amount of bonus paid for each casting made during the day above 80 per cent. of 85. The 4.4 cents is known as the differential.

For each piece of work a bonus chart is prepared and this shows the number of pieces to be made during the day from 80 per cent. to the maximum, together with the differential or the amount the workmen will receive as bonus for each additional unit of production per day. A copy of the bonus chart is posted in the department where the work is being done. Bonus payments are based on good pieces, but defects not due to the specific operation specified on any bonus chart are not deducted in paying bonuses. The bonus prices are not lowered no matter how long the particular job runs with the same pattern, core boxes, equipment and methods of production. The accompanying illustration, Fig. 2, shows a typical bonus chart for molding work, this particular work being ramming the drag on the floor with cope on a truck, in which a number of men are engaged on the job. This work requires two molders of Class 7 and five helpers of Class 5. The differential for the helpers is 4.5 cents, and for the molder 6.3 cents. For making 35 good castings per day, or 80 per cent. of the maximum each helper receives 57½ cents and each molder 80½ cents. For each additional casting each man receives in addition the amount of the differential.

TIME STUDY SYSTEM

In order to standardize the work and make it possible to compile standard data tables and standard bonus charts that can be used for almost all classes of work, various classifications of work have been provided. The first classification is according to the method to be employed in molding. The standard methods of bench and squeezer work are classified under these two heads, bench work including work rammed on the bench, tubs or skids, and machine work covering work done on either hand or power squeezers. There are two job classifications: Class 1, which includes non-cored work, and Class 2, which is cored work. There are six sub-divisions of each of the job classes, as follows: Plain work, single patterns; plain work, gated pattern; irregular work, single pattern; irregular work, gated pattern; complicated work, single pattern; and complicated work, gated pattern. Flasks have been divided into 15 standard sizes, according to plane dimensions, and this standardization has been further carried out by classifying each of these sizes according to five different depths.

With this classification of work standard operation times for all of the above combinations were made up from time studies and standard data tables were prepared. These tables referred to 42,334 combinations of work figured out and tabulated. For each of the 42,334 conditions these tables show the number of molds to be made per day, the number of castings per day and the standard bonus chart number. These tables of time operations for bench

and squeezer work will be printed shortly in book form, and an idea of their scope and the work necessary to prepare them is indicated by the fact that they contain over 125,000 figures and will fill a volume of 230 pages.

The way the tables are used can be made clear by referring to a specific case. Take, for example, a molding job with a gated pattern, six on a gate, irregular cored work with six cores to set, to be run in a 12 x 16 x 9-in. flask rammed on a bench by hand. Being cored, the job comes under job Class 2. It is an irregular gated pattern and this sub-classification refers to the proper page of tables under the bench method. On the proper page opposite the size of flask and in column headed by "six cores to set," it is found that the maximum production for a day of nine hours is 126 molds, or 756 pieces. In an adjoining column is a number that refers to the standard bonus chart for that particular piece of work and but a moment's time is required to refer to the bonus chart file kept as a card index system and secure the bonus chart all figured out.

By thus classifying and systematizing the work the bonus is all figured out before the pattern is made and workmen know what the bonus rate is before they start on a job. In case the work is something special that is unclassified additional time studies may be required. In a case of this kind the workmen are always anxious to have the bonus chart as soon as possible after they start on the job.

In making time studies that will be the basis for the tables and bonus chart the time required by an average man is taken or of a group of men if it is a piece of work like a large mold that requires the joint work of several men. On machine work the average time for three jobs is usually taken. From 3 to 18 time studies are taken on a molding job, depending on the work. On small bench work several thousand time studies have been taken. In addition to making time studies of core making and molding, records are taken of the time required in knocking out and of the time required in the trimming, sand blast and molding room. These studies are recorded on a blank shown in Fig. 3. Bonus payments as tabulated in the bonus charts increase with production of single pieces, lots of 10 and lots of 100, and in some cases with an output of a lot not having a decimal number. In the chart illustrated the bonus increases with each additional casting, but in the case of a small core the bonus is based on additonal hundreds produced. However, in all cases the bonus earned is figured to the exact number.

An interesting time saving method was adopted by the time study man in assigning bonus chart numbers. A number of long paper tapes were suspended over a roller and around a desk as shown in Fig. 1, these tapes bearing numbers from 1 to 12,000, the latter number representing maximum number of pieces called for on standard bonus charts for small flask work. These tapes were used in assigning bonus chart numbers to standard production. As the same number of pieces have the same bonus and consequently the same bonus chart number, when one clerk called off the number of pieces another referred to the corresponding number on the tapes to see if a bonus chart number had already been given to that number of pieces for some other work. If a bonus chart number was found to have already been marked opposite the number of pieces on the tape, this same number was reassigned to the other standard type of production, thus preventing duplication of identical bonus charts with different numbers. In this way the number of bonus charts was reduced to about 1600.

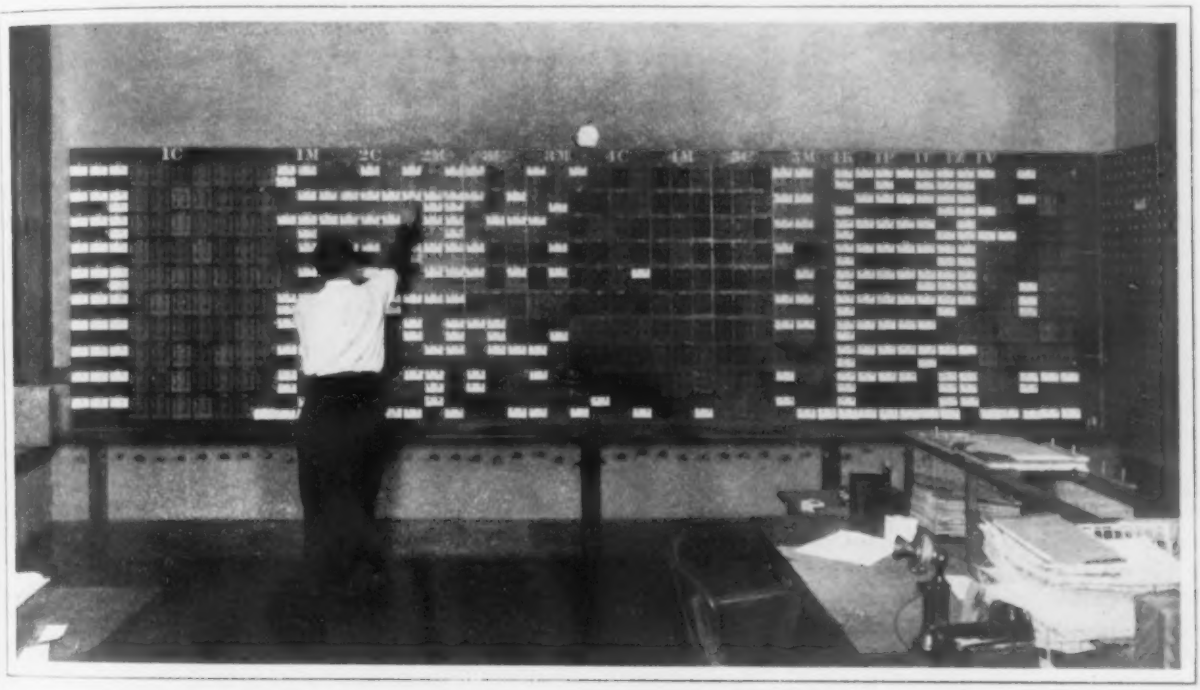


Fig. 7—The Planning Board Where Duplicates of Work Orders Are Hung, Indicating What Each Machine Is Doing and Has Yet to Do

Work is specialized as much as possible throughout the plant. For example, molders do no pouring, this being all done by a pouring gang. Nor do the molders shake out their molds after a day's work. This is done by lower priced, common labor. Fig. 4 shows a gang employed molding transmission cases. A molder is finishing a mold, a helper is ramming a mold and the castings are being poured by the pouring gang.

ORGANIZATION RECORD

The entire detail of the plant organization, control and operation is contained in an organization record of several hundred typewritten pages arranged and classified for handy reference. The duties of the various office employees and others

DAILY SCHEDULE AND JOB TALLY FORM FAP 115 THE ALUMINUM CASTINGS CO.

TO BE MADE IN DEPT. DATE 191

THE FOLLOWING COUNT WAS MADE BY TITLE

I APPROVE THE FOLLOWING AS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF

NOTE—Planning room must fill in six (6) colums one (1) day ahead. Dept. Foreman

Make Today (X)	Work Number (X)	SYMBOL (X)	Pattern or Core Box No. (X)	Man No.	Time	(X) Bench or Floor No.	Bonus Chart No. (X)	TALLY To be posted every time count is made as pieces are finished during the day	TOTAL

Fig. 8—The Blank for the Daily Schedule Which the Work Clerk Must Maintain

outside of the regular plant laborers are explicitly defined so that an employee familiar with the portion of the record relating to his department can have no uncertainty as to the extent of his duties or the limitations of his authority. The record also contains the full details of the shop system. As an illustration of the scope of this record it may be mentioned that nine typewritten pages are devoted to detailing the duties of the day and night watchmen.

The plant is divided into a large number of departments which for convenience in keeping records are symbolized by numerals and letters. There are five core rooms and five molding rooms, each a separate unit. Core room No. 1 is designated, for example, as 1C. There is also a sub-division of the molding and core room units into floors. Each aluminum molding room is divided into 30 floors, two of these being used for the storage of patterns not in the sand, and for the time keeper and foreman. From one to six floors are used for a job. All core benches, molding machines and other equipment are symbolized and numbered. When further identification is desired to distinguish equipment in a particular plant additional letters are employed as symbols. For example, D M 18 designates molding machine No. 18 in the Detroit plant.

All shop orders are handled through the planning room by the route clerk. An order for a customer's work, Fig. 5, goes to the planning room from the sales department as a general order. It contains customer's name, name of casting and quantity, and columns are provided for date and quantities of shipments, the latter items being entered on the order as shipments are made. On the back of the form ruled spaces are provided for the shop routing. After the order has been issued and the work routed the entries on the back of the form show what work has been routed and where. The general orders are issued in duplicate, one being for the planning room and the other for the shipping room files. A cost sheet is opened for each general order when it reaches the planning room.

On receipt of the general order the route clerk analyzes it and issues the proper orders to the shop known as work orders. The order must be analyzed to determine what part of the work is to be done by the several departments necessary to fill the order. In some cases the route clerk will have to consult the production clerk or superintendents and sometimes the factory board. A copy of the work order, Fig. 6, is sent to the foundry, core room, or to whatever department is to do the work specified, and another copy is retained in the planning room, being hung on the planning board, Fig. 7, that occupies a large wall space in that room. Space is provided on this board for every bench, molding floor and machine in the plant as well as for individual units of various other departments. The large letters at the top of the board show what department is covered by the square beneath. For example, on the squares under "1C" are hung the work orders of work that is being done in No. 1 core room. Each space on the board is double. On the lower half is hung the work order that is to follow the one that is being filled.

Each department out in the shop has a board corresponding to its section of the board in the planning room. On it are hung the work orders that come to that department. When an order is completed it is so marked on the work order in the shop and the shop order is sent back to the planning room and its duplicate is taken off the planning room board.

There are two methods of checking the time spent in the shop on an order. One of these is having a blank with the work numbers listed in numerical order. As each work order is made out the order number to which the work applies is listed on this blank. At the same time the routing as provided for on the back of the general order is filled out. When a work order is returned to the planning room the work number is erased. This prevents time being charged in the shop on job time cards against work numbers that have been completed.

The route clerk is responsible for keeping the shop supplied with orders, but he is not responsible for the order in which the work is done, that being entirely up to the order of work clerk. The responsibility for the maintenance of the delivery schedules rests on the latter clerk, who must see that operations are completed according to the daily schedule and job tally sheet shown in Fig. 8. Each department is furnished with one of these sheets on which is scheduled the work to be done in that department during the day and on this sheet is posted the number of pieces finished every time a count is made.

The schedule clerk is an assistant to the order of work clerk. His chief duty is to see that various schedules and records are kept up to date. He works with the order of work clerk in planning and recording the schedules of operations to be performed and follows up details after the work in the shop has started. One of these schedules is a process schedule which is a graphical record showing the chief operations on all unfilled orders, being compiled from the general order when it reaches the planning room. A red ruled line on the schedule indicates work planned for the future and a black line indicates work already done. This record is kept up every day and a break in a line indicates

that no work was done on a particular job during the day. As indicated by an explanation of their duties, the work of the route clerk, order of work clerk and schedule clerk are all closely connected and one cannot work out his day's detail without conferring with the others.

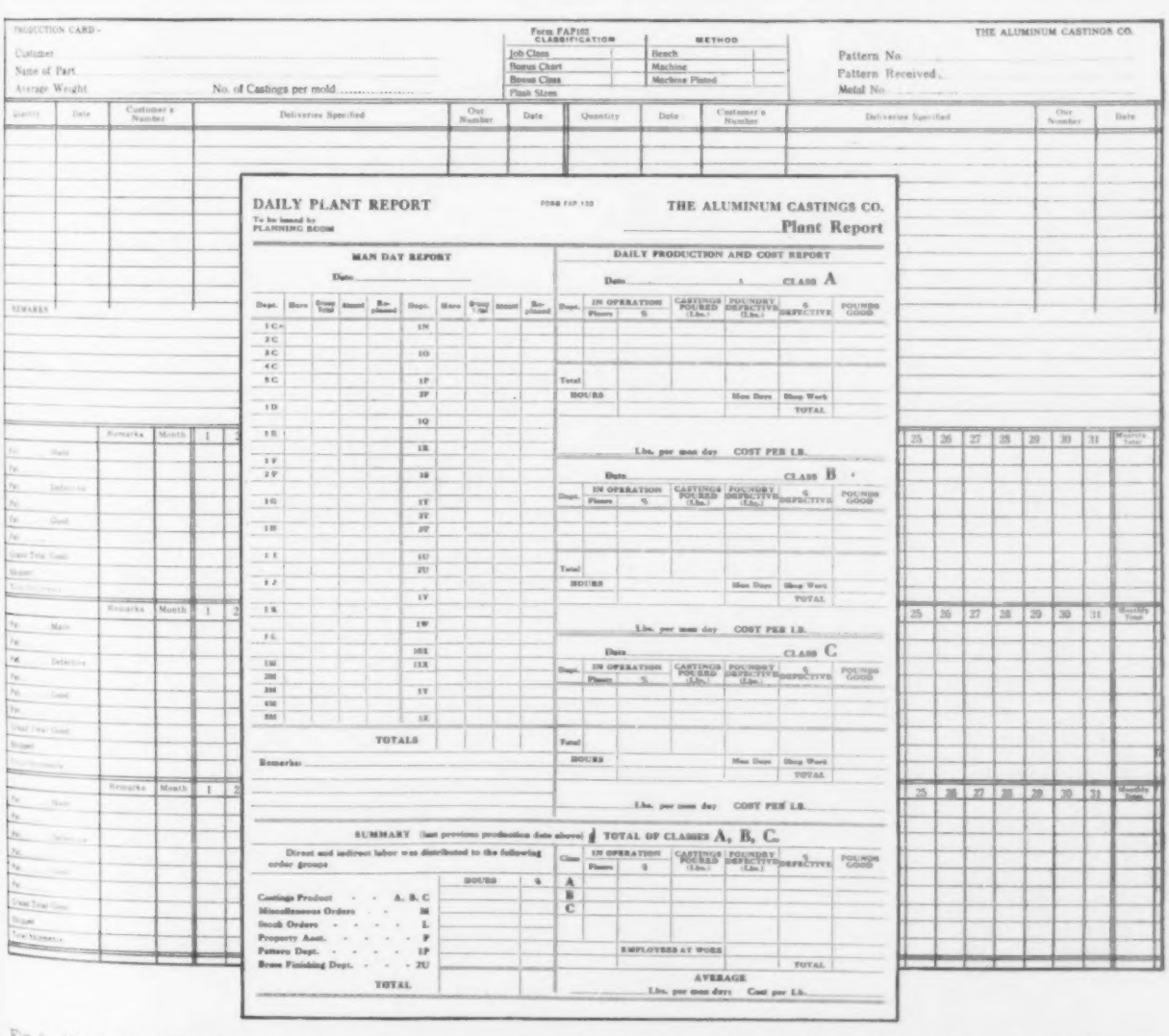
To control the shop methods after the work orders are issued a daily schedule is made out for the foreman of each department of the work he is to turn out the next day, and this is also used both as an order for his day's work and by the time clerk to record the tally of each day's work. The schedule clerk has to be very careful in making out the list of detailed parts on various daily schedule and job tally sheets so that previous shortage of some parts may be provided for as well as to prevent overstocking on some parts and a delay in the production of other parts.

COST KEEPING

No work of any kind is done without authority from the planning room in the form of a work order, which bears the work number to which all time, material and other expense is charged. The cost clerk daily closes all cost sheets for work completed. Columns are provided on these sheets for itemizing cost for labor, material and sundries, which when footed up give the prime cost. To the latter is added the prevailing overhead burden to get the total manufacturing costs. In the upper left-hand corner of the cost sheet space is provided for a recapitulation of costs. Space is provided at the right of the sheet for the production record, this being filled in daily from the daily production record and the defective castings reported.

The timekeeping department consists of a timekeeper in charge of the office, and under him a time clerk in each department. The timekeeper reports to the planning room and is directly responsible to the production clerk. The time clocks and men's time card racks in each department are inclosed in cases and kept locked, except for a few minutes at going to work and quitting time, these being in charge of the time clerk of that department. If a man comes in late he finds his card and the clock locked up and he is unable to ring in his time, but must go to the timekeeper and find if he can have employment that day. Possibly another man has been put on the job, so that the tardy workman will not be needed. Having the clocks under lock and key also prevents a man from ringing in his time and leaving during the day without the foremen's permission. The shop time clerks keep record of the time each man puts in on various jobs in the day. This is done on job time cards issued daily by the timekeeper for each job, the time of starting and quitting work on the job being stamped on the card with a clock stamp. Different colored job time cards are provided for each department. The time clerk as well as the man or gang of men working on a job has a bonus chart for the particular job that is being done. This is returned to the planning room as soon as the job is finished. The bonus charts while in the shop are hung up and protected by a glass cover.

In addition to the regular routine inspection,


PRODUCTION CARD

Customer

Name of Part

Average Weight

No. of Castings per mold

Form FAP102 CLASSIFICATION

Job Class

Bonus Chart

Bonus Class

Finish Store

METHOD

Bench

Machine

Machine Plated

THE ALUMINUM CASTINGS CO.

Pattern No.

Pattern Received

Metal No.

Quantity | Date | Customer's Number | Deliveries Specified | Our Number | Date

DAILY PLANT REPORT

FORM FAP 150

To be issued by PLANNING ROOM

THE ALUMINUM CASTINGS CO.

Plant Report

MAN DAY REPORT

Date

Dept. | Hours | Gross Total | Absent | Re-placed

1C 2C 3C 4C 5C 1D 2D 3D 1F 2F 3G 1H 2H 1J 2J 1V 1W 1X 2X 1Y 1Z 2Z

TOTALS

Remarks

DAILY PRODUCTION AND COST REPORT

Date CLASS A

Dept. | IN OPERATION Pieces | % | CASTINGS POURED (Lbs.) | FOUNDRY DEFECTIVE (Lbs.) | % DEFECTIVE | POUNDS GOOD

Total

HOURS | Man Days | Shop Work TOTAL

Lbs. per man day COST PER LB.

Date CLASS B

Dept. | IN OPERATION Pieces | % | CASTINGS POURED (Lbs.) | FOUNDRY DEFECTIVE (Lbs.) | % DEFECTIVE | POUNDS GOOD

Total

HOURS | Man Days | Shop Work TOTAL

Lbs. per man day COST PER LB.

Date CLASS C

Dept. | IN OPERATION Pieces | % | CASTINGS POURED (Lbs.) | FOUNDRY DEFECTIVE (Lbs.) | % DEFECTIVE | POUNDS GOOD

Total

HOURS | Man Days | Shop Work TOTAL

Lbs. per man day COST PER LB.

SUMMARY (last previous production date above) TOTAL OF CLASSES A, B, C.

Direct and indirect labor was distributed to the following order groups

	HOURS	%
Castings Product - - - A. B. C		
Miscellaneous Orders - - M		
Stock Orders - - - - - L		
Property Asst. - - - - - P		
Pattern Dept. - - - - - 1P		
Brass Finishing Dept. - - - 2U		
TOTAL		

Class | IN OPERATION Pieces | % | CASTINGS POURED (Lbs.) | FOUNDRY DEFECTIVE (Lbs.) | % DEFECTIVE | POUNDS GOOD

A B C

EMPLOYEES AT WORK TOTAL

AVERAGE Lbs. per man day: Cost per Lb.

Fig. 9—Blank for Recording Production for Every Day on Each Product for a Given Customer. Fig. 10—Blank for Recording Production of the Plant

standards of production are established from time to time on various work by agreement with the customers. If the question is raised as to whether a piece is up to the standard the matter is referred to a committee consisting of the service inspector, superintendent and chief inspector, the latter being responsible for the shop inspection. Otherwise the decision of the chief inspector is final.

A perpetual inventory of stock is kept on stores cards, one of which is provided for each class of material. As material is taken from the store rooms the amount left and also its value is entered on the card. The danger limit for stock is entered on a space provided for that purpose, so that a glance at the card will show whether an order for its replenishment should be given. Miscellaneous stores are kept in tiers and bins, the section and space in the section being recorded on the card.

Requisitions for the purchase of material are made out by the foreman of a department where wanted, approved by the superintendent, and a requisition form is filled out and marked O.K. by the manager, who sends it to the purchasing agent.

When employees are to work overtime a form is used for an overtime order issued by the planning room containing the date and employees' names and numbers, this being filled out from a slip requesting the overtime work, approved by the superintendent. A copy of the overtime order goes to the watchman, and unless a man's name is on the order the watchman has instructions not to permit him to enter the plant.

The usual method of making memoranda on a pad calendar of an appointment or something to be done at some future date has been done away with by the substitution of a form known as a "tickler memo." The necessary memorandum is made on one of these blanks on which is also entered the date on which the matter is to receive attention and this is taken in charge by the filing clerk, who sends the memorandum to the employee or official for whom it is intended the first thing in the morning of the day shown by the date on the memorandum. By use of this form a department head can have his own attention called to something that he is to do on a certain future day or he can issue instructions to some employee to do something on a particular day. In the latter case the memorandum of course goes to the man who is to give the matter his attention.

Other forms used previously referred to include a production card for entering a detailed record of production and shipments for each day of the month, a cost summary compiled from the cost sheets, daily metal report, daily plant report, showing total daily production, and standard core routing card which also tells where every core is made and how many are used to a mold.

EMPLOYMENT, SHOP AND OTHER RULES

The employment agent is under the direct charge of and responsible to the superintendent and has sole charge of hiring men, but cannot employ additional labor without the approval of the superintendent. A rule somewhat out of line with ordinary practice is one that requires that every man asking for work be given the satisfaction of an interview and be asked to make out an application. The object of this policy is to make the men feel that the company is taking some interest in them so that when they are again looking for work they will more likely go to that plant first rather than to some plant where they were quickly dismissed with the information that no help was needed. When work is plentiful and labor is scarce, the company feels that it will secure a better class of workmen if it shows consideration when additional labor is not needed.

Various shop rules form a part of the organization record and these are posted throughout the plant. Employees must report to foremen the faulty condition of tools, machines and other equipment, and the latter must report to the production clerk. If repairs are not made within reasonable time the foreman must so report to the superintendent. All accidents, however slight, must be reported in writing by the department foreman to the superintendent, who must pass the report on to the cashier with whatever comments may be necessary. The care and maintenance of the plant is under a maintenance foreman who is responsible to the superintendent through the planning department. Men under his direction have charge of the janitor work, daily inspection, repairing and cleaning of machinery, inspection of the electrical equipment and the operation of the power plant.

Production and Unit Costs Under Old and New Systems Compared

Operations	Old Cost: Molds or Cores made	Pieces good	Number of men	Total day wages	Total cost	Cost per good piece	New Cost: Molds or cores made	Pieces good	Number of men	Total day wages	Total bonus	Total direct cost	Cost per good piece	Per cent. increase in production, good pieces	Per cent., cost reduction
Core making.	2400	2400	1	$1.62	$1.62	$ .0007	9531	9531	1	$1.62	$ .75	$2.37	$ .0002	297	63.3
Molding	11.25	9.25	7	17.22	17.22	1.86	32	32	7	17.75	8.49	26.24	.82	246	55.9
Molding	16	16	8	20.79	20.79	1.2994	27	27	6	16.38	6.104	22.484	.8327	68.7	35.9
Molding	11.7	9.4	1	3.24	3.24	.344	39	39	5	3.24	1.374	4.614	.1183	314.8	65.6
Core making.	80	80	1	1.50	1.50	.0187	252	252	11	1.50	.38	1.88	.0074	215	60.4

COSTS CUT BY SCIENTIFIC MANAGEMENT

Coming to the vital question as to whether or not scientific management in this plant has reduced the cost of production, a very complete record of the cost of making castings under the new system of management and bonus payments has been kept and the figures found in this record show conclusively that there is a remarkable reduction in the costs as compared with the old form of management and the day rate system. These figures also indicate that the employees have also fared well in increasing their earnings by increased effort. Comparing over 400 jobs, job for job, with similar work done under the old system with day wages, the figures show an average increase of production of 206.8 per cent., with scientific management and bonus payments, a reduction of 58 per cent. in the direct labor cost of production and an average increase in wages amounting to 28.9 per cent. The reduction in the total costs, it can be assumed, will fall somewhat below the 58 per cent. saving on labor for the reason that it is admitted that the cost of maintaining the system is greater than under the old form of management, so that the overhead is somewhat higher.

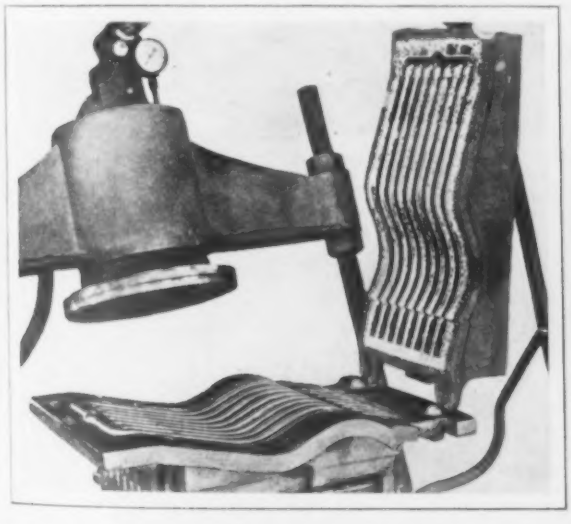
As examples of the greater efficiency of the men

under the bonus system it is stated that 60 to 65 radiator fan molds was an average day's work under the wage system. Under the bonus system this average has been increased to 135 to 140. The latter number pays a bonus of $1.25 per day. The former production of six-cylinder crank-case molds, including the setting of cores ready for pouring, was 15 to 19 molds per day; now it is 45 to 50. The accompanying table contains examples taken at random from the company's record of several hundred jobs and shows the comparative costs, increase in production and per cent. the cost has been reduced, each case being the comparison of similar jobs under the old and new systems. In a very few exceptional cases the figures show a slight increase in the cost of production, but in practically all cases the cost of production has been reduced at least 30 per cent. The figures show a wide range of percentage through which the costs have been reduced on different jobs. That there is this wide range in the percentage of cost reduction is attributed to the rule of thumb methods ordinarily used in foundries and the inaccuracy in figuring out costs under these older methods.

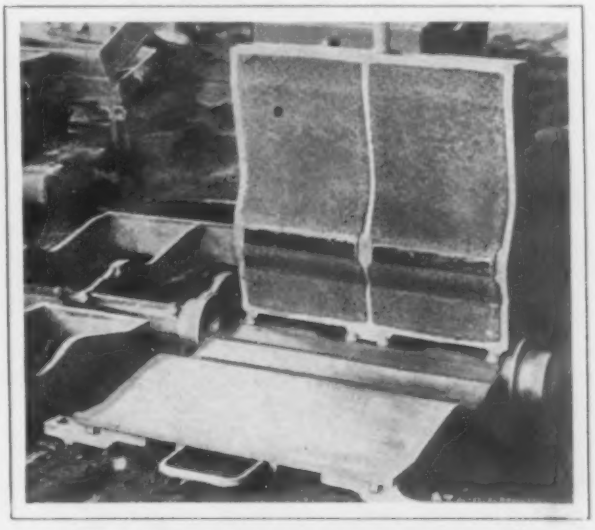
A Case of Quantity Production Molding

Pattern All in the Cope, Which Was Made on a Stripping Plate Machine —The Drag Made on a Dummy

The Golden's Foundry & Machine Company, Columbia, Ga., has developed an interesting method of molding what are called gin saw frames or gin ribs. All of the frames are exact duplicates of the pattern and are finished smooth on the face by grinding. It was figured that as 100,000 of the parts were to be furnished each year, it would be better to mount the patterns on a stripping plate machine and to use a pneumatic ramming head for the cope of the mold. These gin ribs or frames must be of the same thickness to provide an equal spacing for the saws. The patterns are chilled on the wearing edges to prevent wear.



The Cope of a Cotton Gin Saw Frame Pattern Showing the Pneumatic Ramming Head



The Dummy Drag with the Chill in Position

In doing this work it was planned to have one man handle the molding, and with that idea in view the patterns were arranged on a stripping plate machine with a pneumatic ramming head, the joint of the flask being the same shape as the parting of the mold. The back of the rib is cast in the cope so that the face or the flat side which is to be ground will be perfectly clean. There is a ball and socket joint on the cope, as indicated in the illustrations.

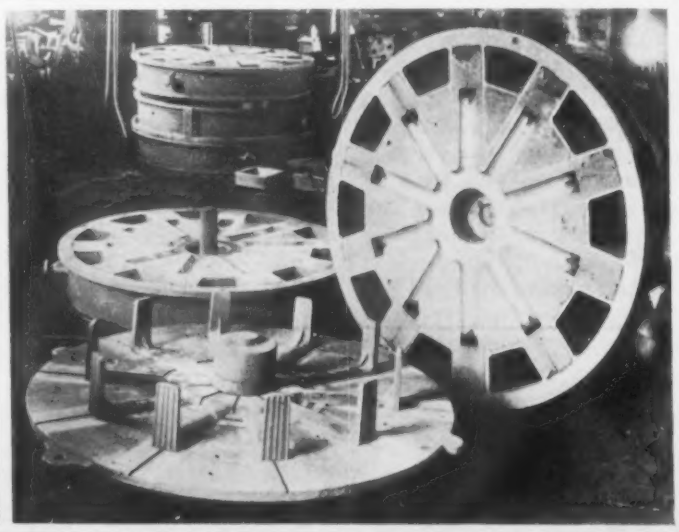
The drag was made on a dummy, the surface of which was the shape of the face of the rib. This dummy was mounted on wheels and rolls along the molder's floor on a track. One man can handle easily the ramming up and rolling over of this portion of the mold. The surface of the gin rib has to be chilled for a space of 2 in. where the gin saws pull the cotton through, and the chill for this purpose was placed in the drag, as is shown in one of the accompanying illustrations. After the drag was rammed up and the sand struck off it was rolled over on the ball and socket joint to a bed made for it back of the dummy. This bed was made by striking off the sand back of the mold level with the track. The joint on the drag was of the ball and socket type, the same as that on the cope. Two copes were placed on each double drag and separate gates were provided for pouring the cope.

A Group of Molds Ready for Pouring

Manufacture of the Steel Rim Pulley

The Successive Operations from the Casting of the Spider to the Final Grinding of the Steel Pulley Face

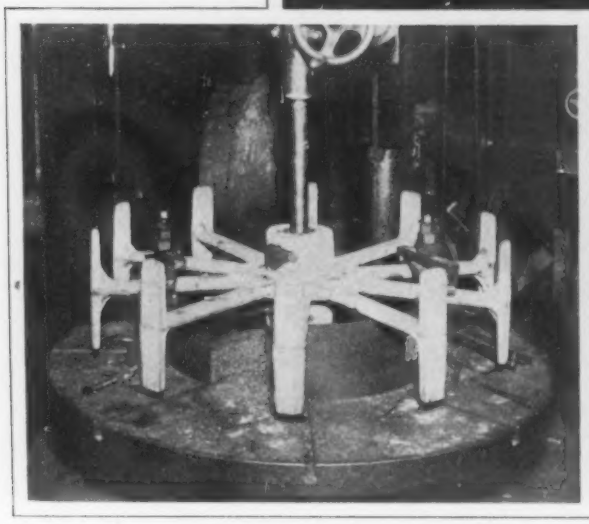
The success which has attended the use of the steel rim pulley lends interest to the process of manufacture of this type of construction. The steel plate rim gives to this pulley a much greater tensile strength than the solid cast pulley; the cast-iron spider a stiff construction in comparison with the pressed steel pulley, while the combination of steel rim and cast spider, accurately assembled, yields a true running and well balanced pulley. Exactness in construction rests on grinding both spider and rim to finished sizes, while the steel plate gives a better pulley face than it has been found possible to secure by grinding cast iron. Around this style of pulley the business of the Medart Patent Pulley Company, St. Louis, has largely developed, although the company now manufactures a full line of transmission machinery. The steel rim pulleys are made in sizes from 8 in. in diameter and 3-in.



face to 168 in. in diameter and 50-in. face, using plate up to ⅝ in. in thickness for the rims. Illustrating the successive operations from the casting of the spider to the final grinding of the pulley face, the accompanying views are here presented.

The pulley spider is cast in a two-piece mold made in cast-iron flasks from a match plate with metal patterns. The match plate is laid on the foundry floor and the mold rammed up by hand. Fig. 1 illustrates the match plate for a 24 x 40-in. pulley with the arm patterns and core print mounted and the cope and dray molds ready for setting the hub core, locking up and pouring. The match plate has radiating grooves corresponding to each arm of the spider, the arm patterns in turn being cast with lugs which fit into these grooves, securing both the alignment and centering of the patterns. A drilled hole in the center of the plate centers the core print. Cope and dray are practically identical except for the gating, which provides for pouring the casting through two gates, one on each side of the core print. The hot iron is taken from the cupola in 1500-lb. ladles which are handled by crane and ladle car to the pouring floor where the hot metal is transferred to bull ladles holding about 750 lb. The air hoists used to handle the flasks and molds serve also in supporting the ladle for pouring.

For all pulleys up to 144 in. in diameter, the molds are made from a match plate, and the spider arms are cast solid as indicated by the patterns, the arms for the largest sizes only being cored out in which case the spider molds are made by ordinary methods. To reduce the amount of grinding on the faces of the arm lugs when finishing the spider, these faces are cast with corrugations. In the case of split pulleys, two of the lugs are cast longer and wider to give a bearing for making the rim joints, but this is only for the smaller sizes and lighter service pulleys. In the larger pulleys the joints are staggered with the spider arm contacts, the butt being made and reinforced with a T-shaped steel casting. The number of arms in the steel rim pulley is larger than for the same diameter in a cast



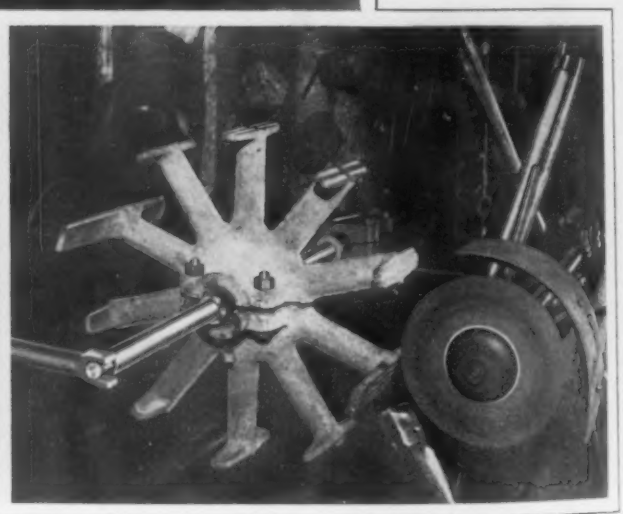


Fig. 1—Molds and Match Plate for 24 x 40-in. Pulley Spider

Fig. 2—View of Spider Set Up for Boring

Fig. 3—Grinding Spider to Finished Circumference

pulley but arm cross-section is, of course, smaller.

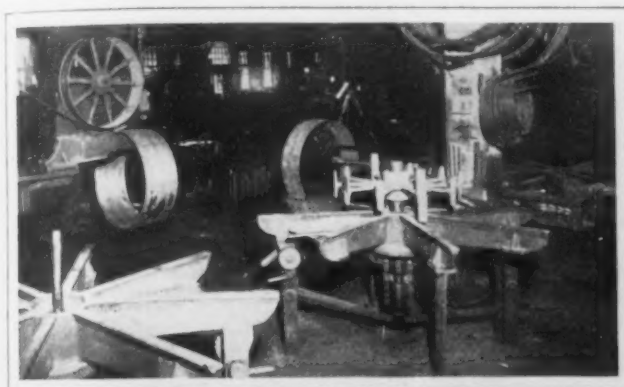
The first machining operation is the usual one of boring the hub. For the largest sizes a specially rigged vertical boring machine with jigs for quickly and accurately centering the spider is used, and for the smallest pulleys a simple horizontal boring bar with lathe head and chucking dog. Intermediate sizes are bored out in an upright drilling machine with a vertical boring bar. The spider is centered on the face plate by gauge and the hub roughed out at high speed. One light finishing cut is finally taken. This set up is shown in Fig. 2.

The drilling for the set screw follows, or in the case of split pulleys this drilling is for the holding bolts in the hub. In casting the split spider the hub is cut away except for a thin fin which is now broken through but left rough so that when the halves are again fitted together they will be brought back into exactly the same relation as when cast. The spider is then mounted on a horizontal arbor with a lateral adjustment and outboard bearing and set up for grinding the faces of the rim lugs to a true circle concentrically with the pulley axis and of the desired diameter as shown in Fig. 3.

The rim steel is standard flange steel shipped from the mill in pulley face widths and approximate circumference lengths. The rolling into circles is done on the usual bending rolls, the equipment including both parallel and taper rolls for straight and crown face pulleys. The fitting of the rim to the spider is hand work consisting of the three steps illustrated in Fig. 4. The spider is mounted on an arbor and the rim circle as rolled is drawn up around it to an exact fit with a screw and steel ring clamp. The overlap is then marked for shearing. The rim is fitted again, the butt ends of the rim being filed to an exact fit with every arm in full contact with the rim. Without removing the ring clamp securing the rim on the spider, the rivet holes are then drilled without disturbing the adjustment of rim to spider as shown in Fig. 5. The pulley is then mounted on a stand, the joints bottled up and the rivets driven with a pneumatic yoke riveter suspended from a trolley, Fig. 6.

The finishing operation consists in grinding the face and edges of the pulley rim to a true surface. This grinding is illustrated in Fig. 7. In order to preserve the normally uniform cross-section of the steel plate rim, the greatest irregularities in the rim are trued up before grinding. This preserves the balance of the pulley, saves metal in the rim and reduces the amount of grinding necessary.

The special rigs upon which the pulleys are mounted are made in a range of sizes to accommodate pulleys of different diameter and are equipped with hand feed. The operators become very expert in finishing the pulley face with the result that there is a minimum cutting of metal.



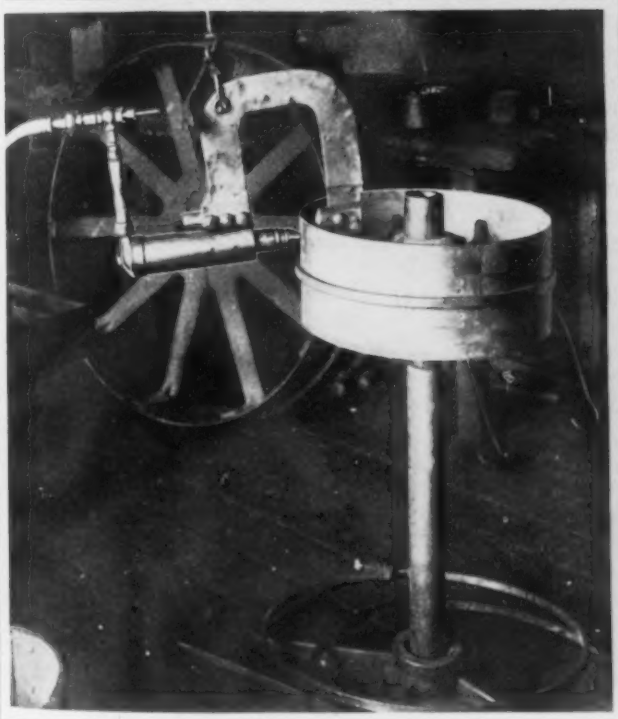
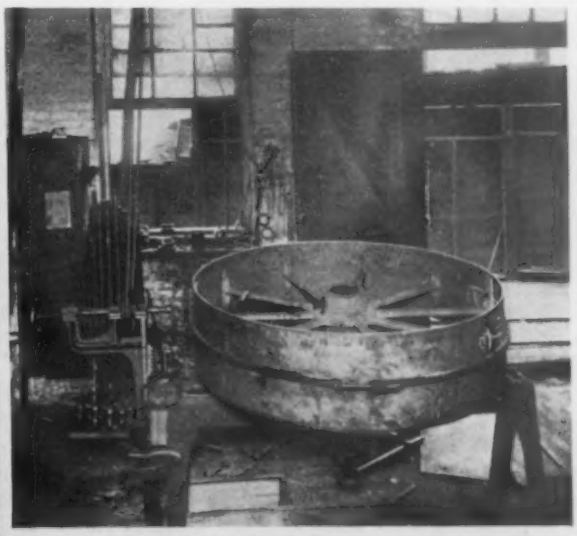


Fig. 4—Spider Mounted on Adjustable Table for Fitting the Rim. The rim is sheared and filed, facilities for these operations being grouped for handling by one man

Fig. 6—Portable Floor Stand for Riveting



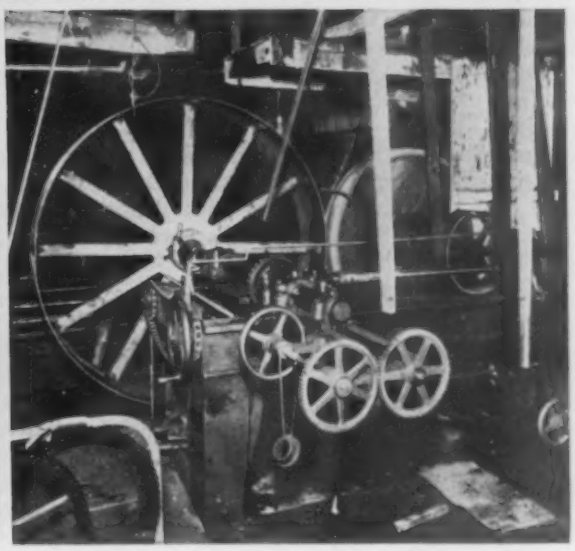


Fig. 5—Drilling the Holes for Riveting the Band to the Spider

Fig. 7—View of the Special Rigging for Grinding the Pulley Faces

Dry and Green Sand Castings Compared

Reason for the Superiority of the Former —Precautions in Using and Preparing the Molds for Small and Large Castings

BY PAUL R. RAMP*

Dry-sand molds produce castings superior to those made in green sand. While the metal poured into the green-sand mold may be identical with the metal poured into the dry-sand mold, the dry-sand casting will be more easily machined, and will be freer from internal strains than the casting made in green sand. The surface of large castings when made in dry sand is much smoother and more uniform, and more true to pattern than any made in green sand. The dry-sand casting develops fewer sand holes and other similar imperfections while going through the machine shop. We might say in detail that the dry-sand mold produces the following results in castings: makes them smoother, stronger, softer, cleaner and reduces internal strains.

The reason the casting is smoother is because the surface of a dry-sand mold when properly rammed, is hard enough when dry to allow the workman to stand upon it without making any impression in it. This hard surface when properly vented, resists the pressure of the liquid metal when the mold is filled and overcomes any irregularity caused by soft spots in the surface of the mold which is always in evidence in green-sand molds. As the material used to make these molds is necessarily very open and the mold is thoroughly dried, there is no necessity of surface nailing, which eliminates one more objectionable decoration always found on a large green-sand casting; as the surface nail mold produces numerous small imperfections at every point where the head of a nail is exposed to the metal. The fact that a heavy coat of carefully prepared plumbago is applied to this kind of a mold and carefully slicked down and finished with a camel brush is one more reason why a smooth casting is produced.

DRY-SAND CASTING STRONGER

The dry-sand casting is stronger than the green-sand casting because when the metal in the mold begins to solidify, the heat from the same has a tendency to expand the material that constitutes the cores and mold; and a compression of metal takes place which has a tendency to close up any open or soggy spots that usually occur in a casting of many irregular sections. Not so with the green-sand mold. When this expansion of metal takes place just before the solidification, instead of a compression of the metal, the surface of the green-sand mold gives way.

Another reason why the dry-sand mold produces the stronger casting is, that the character of the surface of the mold is such as to retain the heat which tends to anneal the casting. This, and the absence of the chilling effect of the damp sand that is experienced in the green-sand mold, make it possible to use a metal very low in silicon and high in combined carbon that will machine readily and at the same time, develop a high tensile strength. The carbon being in the combined state, produces the close grain surface that is so much sought after by machine tool builders, without increasing the hardness. Some foundrymen may smile at the suggestion that metal can be treated after it enters the mold but nevertheless, it can be and is done successfully.

The reason the dry-sand mold produces a softer casting than the green-sand mold is explained in describing the reason why a stronger casting is produced.

The dry-sand casting is cleaner because there is less danger of the surface of the mold scabbing or cutting when it comes in contact with the metal and it is recognized that nine-tenths of the sand holes found in machine castings are the result of the action of the metal on some part of the mold. It is possible to allow the metal to drop on the bare surface of the mold for a short period before the iron reaches this point in dry sand, which would be very dangerous in green sand. The question of freeing the mold from foreign matter, such as sand, etc., that has been created in placing the cores and anchors, is simplified in dry-sand work as a heavy blast of air can be introduced into the corners and crevises without damage to the mold. In making the same casting in a green-sand mold, it is impossible to extract all the sand and dirt that has accumulated after the cores are placed.

ANNEALING EFFECT OF THE MOLD

The annealing action of the mold on a casting is very beneficial in reducing the internal strains in large bed or cylinder castings. Dry-sand molds are not shaken out until the day after they are poured. This provides 12 or 14 hours annealing which improves the quality of the casting, as far as internal strains are concerned, at least 25 per cent. The hard surface of the mold and cores cause the casting to retain the weight and sections provided for by the designer, who has, no doubt, taken into consideration internal strains and contraction. With a green-sand mold this is possible only to a limited extent.

One more advantage of the dry-sand mold, which is very important, to the manufacturers of machinery, is the fact that the castings that are produced after this method, are closer to the designer's weight than any made in green sand. If a green-sand mold was rammed hard enough to withstand the pressure of the metal, the iron would not lay to the surface of the mold, but would cut it very badly and produce dirt.

PRECAUTIONS IN USING DRY-SAND MOLDS

The above description of the advantage of the dry-sand mold over the green-sand mold makes the former appear as a remedy for all the ills that befall a casting. However, it must be remembered that unless certain rules are carefully observed, the dry-sand casting will not always be perfect. For instance, the molds must be thoroughly dried and not burned. The material for the mold must be open and the mold must be well vented. Special provisions must be made to avoid crushes, as the dry-sand mold will crush much easier than green

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sand. There is no give to the mold and if one joint fits close enough to bring excessive pressure on the mold, a portion of the same is sure to be broken off. For this reason provision must be made for more clearance on joints than when making a green-sand mold. While this additional clearance produces an objectionable fin on the casting, it is the only safe way to make these molds. All bearings such as the joint between cope and drag or bottom plate and drag must be an iron to iron bearing. This can be effected by driving metal wedges between the flask and the plate after the clamps are put on. The iron to iron bearing prevents the sand joints from crowding each other enough to break the mold.

The amount of drying necessary for large molds of this description can be reduced a great deal by the use of brick which can be built up in the flask within two or three inches of the pattern. These brick help to absorb the dampness, reduce the amount of ramming necessary and provide a vent passage that is very desirable.

Some important items in successfully making dry-sand work are as follows:

The metal flask should be made strong enough to withstand the pressure of the metal and of the expansion that takes place while the casting is solidifying.

The next important item is the sand mixture. The following are several dry-sand mixtures that have proven very successful:

No. 1.—Millville gravel, 50 per cent.
Coarse sharp building sand, 50 per cent.
Flour, 1 to 14.
Wet down with clay water.

No. 2.—Coarse fire sand, 70 per cent.
Heavy molding sand, 30 per cent.
Flour, 1 to 13.
Dampen with clay water.

No. 3.—Coarse sharp building sand, 50 per cent.
Heavy molding sand, 50 per cent.
Flour, 1 to 13.
Dampen with clay water.

No. 4.—Jersey gravel, 50 per cent.
Burnt sand, 50 per cent.
Flour, 1 to 13.
Wet with clay water.

PREPARATION OF THE MOLDS

These molds must be rammed very hard; all pockets and recesses must be made solid. When this is done, the question of finishing the mold is a more simple matter; as with a dry-sand mold rammed soft, particles of sand leave the mold and cling to the blacking swab when the wet blacking is being applied. The facing sand must not be too damp or the surface of the mold will swell and crack in drying. A burnt mold is more dangerous than a green-sand mold and the best practice is to shake the mold out when it is discovered that it is burnt. Where large deep molds are made in a flask, it is very often necessary to brace the walls of the mold before putting them in the oven. To do this without marring the surface, a good plan is to place a sheet of oil paper next to the wet surface before the blocking is put in.

A mold that is not thoroughly dried or is composed of material that is too fine or close, produces a casting with the sand burnt to it very badly. When a mold is not properly vented, the same trouble is experienced. Sometimes a poorly vented mold will not cut or scab, but will cause the plumbago to wash off in thin flakes which makes an undesirable surface on a part of the casting that is molded up.

There are some sands that produce dry-sand molds with the mold only dried two or three inches from the surface. In making castings in molds of this kind, it is the best practice to allow this half dried mold to cool before it is closed up ready for casting; because when a mold that is not thoroughly dried is closed up while it is warm, the mold almost invariably fills with steam which condenses and the moisture is absorbed by the cores.

When the metal comes in contact with these cores that have absorbed this moisture, a commotion is created that has a tendency to chew off here and there particles of the cores or mold which rise to the top of the casting and produce dirt. In producing castings in dry sand with a desire to be benefited by the additional strength without increasing the hardness, the following is a fair sample of how the iron mixture should compare with an iron mixture for a similar casting made in a green sand. A green-sand casting having an analysis of silicon, 2.25; phosphorus, 0.50; manganese, 0.60, and sulphur, 0.09 per cent., if made in dry sand, should be made of a mixture that would produce an analysis as follows: silicon, 1.70; phosphorus, 0.40; manganese, 0.60, and sulphur, 0.09 per cent. The tensile strength of the second mixture will be several thousands greater than the tensile strength of the first mixture. And in most every case the second analysis, which has been through the self-annealing process in the dry-sand mold, will machine much easier than the iron used in the green-sand casting although the silicon is much lower.

LARGE CASTINGS IN DRY SAND

Many are under the impression that there is a limit to the size of the casting that can be economically produced in dry sand. This is a mistake. If the mold is too large to pick up and put into an oven, the usual practice is to dig a pit, and build in it a large metal flask which is provided with the necessary binders, etc. Any large pattern can be rammed up in this flask by being bedded in, almost as easily as when the mold is rammed up and rolled over. This is accomplished by the use of brick filling, which operation consists of the molder filling in his flask with brick within two or three inches of the pattern and as each course of brick is laid, one ramming is made which brings the sand flush with the top of the brick. A mold made this way dries very easily and produces a hard surface that is backed by the brick which will not give when the pressure of the metal comes on the surface of the mold. The usual plan is to cover this mold over with sheet iron and dry it with charcoal baskets in the same manner as large molds are made in the floor and skin dried. The advantage of the dry-sand over the skin-dried mold is almost as great as the advantage of the dry-sand mold over the ordinary green-sand mold. The writer has made many large castings after this method and found it cheaper and superior than green-sand or loam work.

This argument in favor of dry-sand castings is not meant to convey the idea that a good casting cannot be made in green sand, but simply to demonstrate that the dry-sand casting is superior to any similar casting made in green sand.

One of the most important items in the making of green-sand molds is the ramming of the sand. If the mold is rammed too hard, the metal will cut it. If the rammer is allowed to strike the pattern and the sand simultaneously, a scab will result on this part of the mold. If it is rammed too soft, a swell will result. If the sand is too damp, a cut or scab will be in evidence on the casting. With the dry-sand mold, the only rule necessary to follow is to ram hard and vent well. Hence the dry-sand mold takes care of one of the most important operations in molding—ramming.

A Universal Tool-Grinding Machine

In designing the new combination cutter, reamer and drill grinding machine of the Wilmarth & Morman Company, Grand Rapids, Mich., an effort was made to construct a machine that would be absolutely universal in its operation, be strong and substantial and also cover a comparatively large range in the size of work handled. Some idea of the variety of work ground can be secured from the accompany illustration as well as the convenience of handling the various adjustments and feeds.

The base of the machine has an inner column bolted to it, so as to form practically a single member. The spindle bearing head is bolted to the top of this column and around the latter rotates the outer sleeve which is clamped in any desired position by wedges. The setting of the table in relation to the grinding wheel spindle is indicated by a graduated dial at the top of the base. The outer sleeve has a ground bearing for the knee which has gibs to provide for wear. The knee is raised or lowered by a handwheel having graduations along the rim.

The saddle which is fitted to the top of the knee supports the sub-table and the table proper, the latter being carried on a circular bearing with auxiliary supports near the end of the table which are relied upon to prevent springing. Graduations in degrees are provided to adjust the table for grinding tapers and in addition there is a fine adjustment by two knurled head screws in front of the table which enables adjustments to a small fraction of a degree to be secured without unlocking the bolts providing the main clamp. The table has a single T-slot in the center and the centers are located in line by the same operation that clamps them to the table. Either the dead center or a chuck or face plate can be mounted in the headstock and the bushing can be removed and used in the universal attachment when desired.

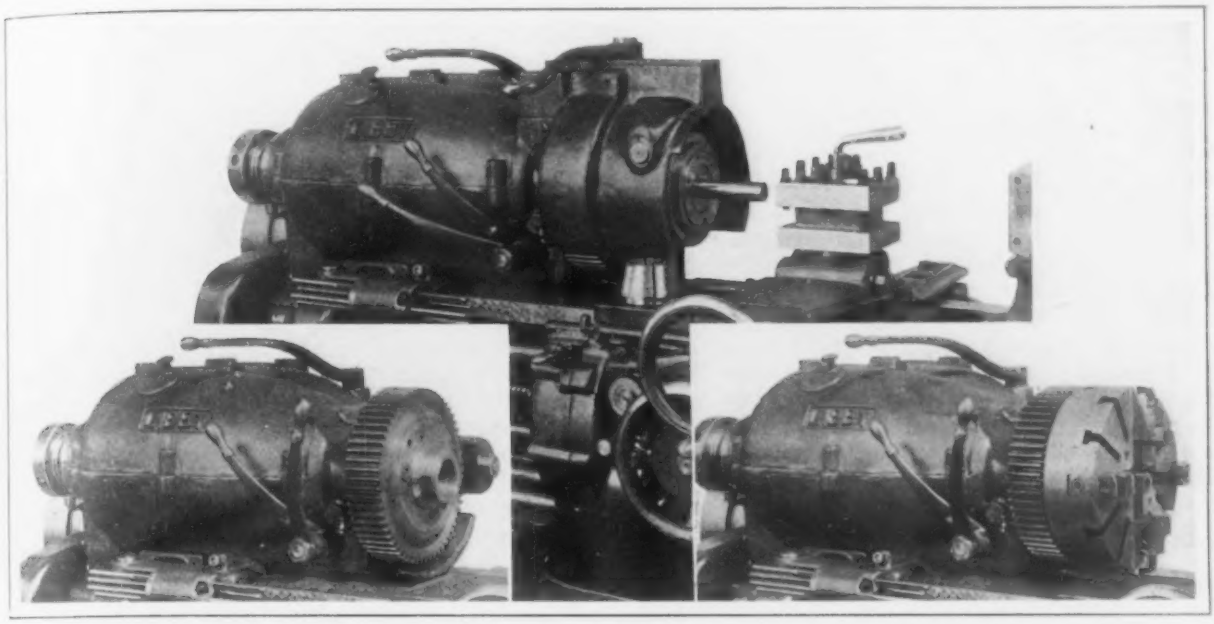
Surface, cylindrical or internal grinding is usually done from the front of the machine, as it is possible to observe the cutting action of the wheel more readily from this point of view. The longitudinal movement of the table under such conditions is provided by the upper right handwheel which imparts the longitudinal movement to the table through a worm gear. The ball crank handle in the front of the saddle provides the cross feed and the vertical movement is regulated by the lower right handwheel, all of which are within reach of the operator without leaving the regular working position. When the teeth of milling cutters are being ground, it is necessary to stand at the rear of the wheel and to one side of the knee to observe the action of the wheel on the cutter. The lever movement for imparting longitudinal travel to the table is utilized. The cross feed is manipulated by a ball crank handle leading out at one side of the saddle to the rear and the means for controlling the vertical movement is also within easy reach of the operator. The worm operated handwheel is, of course, thrown out of engagement when the lever movement is employed to control the table travel.

The longitudinal movement of the table is 22 in., while the cross movement is 8 in. The knee has a vertical adjustment of 11 in., and the working surface of the table is $5\frac{1}{2}$ x 42 in. Work 10 in. in diameter can be mounted between the centers, the maximum distance between them being 30 in. The internal grinding attachment which is furnished enables holes ranging in diameter from $\frac{1}{2}$ to $1\frac{1}{4}$ in. and 3 in. long to be ground. It is also possible to grind holes larger than $1\frac{1}{4}$ in. in diameter up to the length of 5 in. The vise, which is provided with both angular adjustment and a swivel base for the grinding of compound angles, has jaws $4\frac{1}{8}$ in. wide and 1 in. deep. The opening of the jaws is $2\frac{3}{8}$ in. The net weight of the machine complete including the attachments regularly furnished is approximately 1200 lb. With the universal attachment cutters up to 16 in. in diameter can be ground over the table.

A New Universal Cutter, Reamer and Tool Grinding Machine and Some of the Work Handled by It

Turret Lathe for Bar and Chuck Work

A new type of collet chuck has been applied by the International Machine Tool Company, Indianapolis, Ind., to its Libby turret lathes, the 18-in. size of which was illustrated in *The Iron Age*, April 27, 1911. This chuck enables the lathe to be changed from a chucking machine into one for handling bar stock or vice versa in a few minutes without any alteration, except in the chuck and in the tools on the turret. The chuck has a capacity for bars ranging in diameter from ¾ to 3 in., and the collets can be furnished for round, square or hexagon stock throughout this range, the size of the opening varying by ⅛ in. The accompanying illustration and the two smaller inserts show the arrangement of the headstock in changing the machine from one for handling bar stock to one equipped for chucking work.



Views of the Headstock of a Recently Developed Interchangeable Turret Lathe for Bar and Chucking Work. The Large View Shows the Tool Equipped for Handling Bar Stock, the Left Insert Is a View with the Collet Chuck Housing and Body Removed, and That at the Right Illustrates How the Machine Has Been Changed in 20 Min. to a Chucking Lathe

The collet chuck is a self-contained unit and the housing which carries lever control and the fork is bolted to a pad on the headstock housing over the front spindle bearing, which is one piece with the bed casting. The removing of four bolts enables the collet chuck housing with all the parts to be taken from the machine, and the collet chuck body, which screws on the threaded nose of the machine spindle, can also be quickly removed as one unit. The taper seat on the spindle enables the collet or the standard chuck to be located firmly and accurately. The collets have four segments and the design is relied upon to keep them in approximate position when there is no stock in the chuck. All the sliding or wearing parts are of hardened steel and the controlling lever for operating the chuck is located in a convenient position adjacent to the spindle changing levers on the headstock.

The large central portion of the accompanying engraving shows the company's 18-in. turret lathe with a collet chuck mounted in position for handling bar work. In the lower left corner the same machine is shown with the collet chuck housing and body removed. The corresponding engraving at the right is a view of the machine with a standard four-jaw combination chuck mounted in position for handling chucking work. The time required for the removal of the collet chuck housing and body was 15 min. and the time for mounting the combination chuck was 5 min., so that the complete change from a bar to a chucking machine was accomplished in 20 min. In making the change all the operating parts of the machine and the headstock, including the main driving gear, were not disturbed.

An All-Metal Box for Making Cores by Hand

A new all-metal core box has been placed on the market by the Scott-Johnston Mfg. Company, Dayton, Ohio. Among the features claimed for the device are a reduction in expense, as a smaller number of core boxes are required, and that the length of the core can be varied as desired. The box that is designed to make cores 2 in. in diameter and 9 in. long will also turn out cores 10 in. long and as much shorter as may be desired, and vented for any required distance. This variation is secured by shortening the vent wire to the length desired. The box is made of brass with a view to providing wear resisting qualities and making it non-corrosive. In use the plunger and the receiver are gripped firmly and the box is driven into the sand pile. This action fills the tube of the core box, but does not compress the sand, this being done by tamping the sand firmly and forcing the plunger in to compress the top of the core. This, it is pointed out, will make the compression equal throughout the entire length of the core and cause the sand to pack around the vent wire, thus giving a perfect hole when the wire is withdrawn. After the core is made the plunger is drawn out and inverted for use of the ram to push the core out upon the receiver, from which it may be rolled off on a plate ready for baking.

The largest single order ever placed in the United States, it is stated, for sugar-mill machinery was given Thursday, August 27, by the Manati Sugar Company, of Cuba, to the Fulton Iron Works, St. Louis. The machinery will weigh 3000 tons and will consist of two mills each of two rows of rollers each 3 ft. in diameter and 7 ft. long, comprising four sets, or 12 rollers in all. A hydraulically operated regulator will control the pressure of each of the mills and two engines will be provided to drive each mill. Each of the two mills will have a grinding capacity of 4000 tons of cane daily. The order aggregates $250,000. The Fulton plant is working 300 men on the day shift and 150 at night, running 23½ hours per day.

Manganese Bronze as Engineering Material

Its Advantages and Application—The Composition and Physical Properties—Processes of Manufacture

BY LOUIS P. WEBBERT*

The use of manganese bronze as an engineering material covers a period of about 25 years. In fact the development of this alloy has been due primarily to the discovery of P. M. Parsons of London, England, who ascertained that when a small quantity of aluminum is added to melted brass high in zinc, a remarkably fluid metal is produced. This discovery enabled him to produce sound and clean castings.

Manganese bronze has an established place among engineering materials today on account of its great strength, non-corrodibility, moderate cost, wide scope of application and simple method of manufacture. It receives its name from the metal manganese which is a constituent part of the alloy.

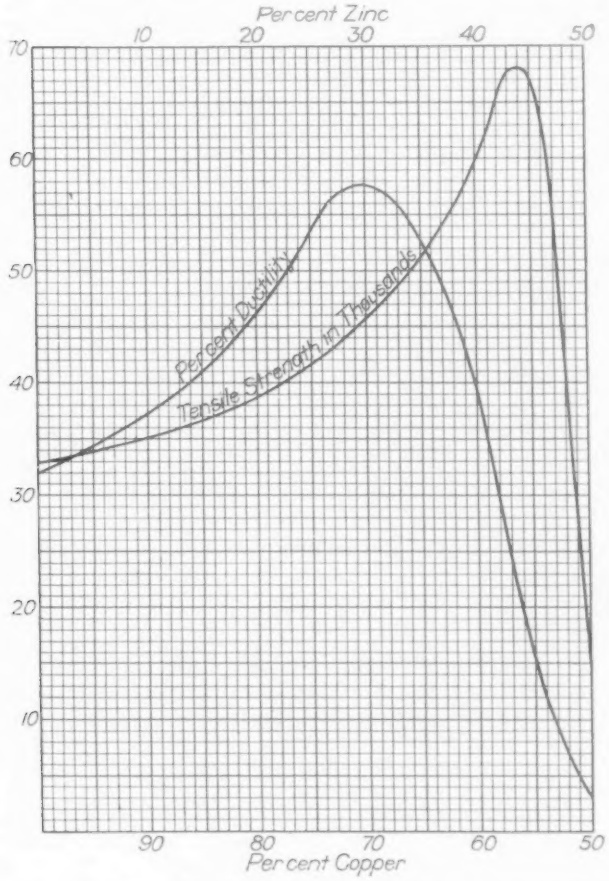


Fig. 1.—Charpy Curves Showing Strength and Ductility of Copper-Zinc Alloys

However, the term bronze is correctly applied only to those alloys composed of tin and copper and there was a time when the term bronze was applied to any new alloy for which its discoverer fancied great possibilities. The alloy manganese bronze therefore is incorrectly named. Technically speaking it is a brass containing small amounts of tin, iron, manganese and aluminum.

COPPER-ZINC ALLOYS

If manganese bronze is a brass, strictly speaking, how is it related to other alloys of copper and zinc? Why does this alloy possess more strength than other alloys of copper and zinc, and why can its physical properties be easily affected by slight changes in chemical composition? The curves in Fig. 1 will assist in showing the variation in the strength and properties of copper-zinc alloys and will enable us to understand why manganese bronze contains the proportions of copper and zinc which are prescribed for it. By means of these curves Charpy (Bulletin de la Société des Alliages) shows the variation in the strength and ductility of cast copper-zinc alloys containing different percentages of copper and zinc. The curves begin showing the tensile strength and ductility of pure copper. Then with increasing percentages of zinc and decreasing percentages of copper, as shown at the top and bottom of the curves, the tensile strength increases gradually at first, then rapidly up to a composition of about 56 per cent. copper and 44 per cent. zinc. After this point is passed there is a decided drop in the tensile strength when the alloys become brittle with increase in zinc. Beyond 50 per cent. zinc the tensile strength curve is of no interest. The ductility or percentage elongation curve reaches a maximum before the tensile strength curve reaches its maximum.

The fluidity of the melted metal varies with the increase in zinc. Although this property cannot be measured it is known that the alloys of copper and zinc showing the highest tensile values on the curve are sluggish metals in the fluid state and when cast give bad and dirty castings. P. M. Parsons, who began the development of manganese bronze in 1876 by introducing iron and manganese into his brass mixtures, met with this trouble. He discovered that in adding a small quantity of aluminum to his melted alloy, the metal became very fluid and as a result he obtained clean and sound castings. He procured a patent for his new alloy in 1888.

If, given the curve in Fig. 1, we should be asked to produce a copper-zinc alloy giving the highest tensile strength, we would choose an alloy at the peak of the curve giving 56 per cent. copper and 44 per cent. zinc. The elongation at this point is about 20 per cent. After having studied the effects of tin, iron, manganese and aluminum upon copper-zinc alloys, we should add sufficient amounts of these metals; we would then have our present formula for manganese bronze.

The specifications given in Table 1 show the chemical and physical requirements.

EFFECT OF METALS ON MANGANESE BRONZE

In these specifications it will be noted that small additions of tin, iron, aluminum and manganese are required to give the best results. The effects of the different metals are described in the following paragraphs.

Tin—Tin is added to manganese bronze to give added strength and an increase in the yield point. With increasing amounts of tin the ultimate tensile strength and yield point are increased until a percentage of about 0.8 is reached. Beyond 0.8 per

*Chemical engineer, Bath Iron Works, Bath, Maine.

cent. there is a further increase in the ultimate tensile strength and yield point of the alloy but a marked effect is produced on the ductility which is lowered. This indicates that increasing the tin beyond 0.8 per cent. tends to make the alloy brittle. The amount usually added is 0.75 per cent.

Iron—Iron increases the strength of manganese bronze and raises the yield point. The importance of having this metal present lies in the property that iron has of closing the grain of the alloy. Without iron the grain of manganese bronze would not be small but would show up coarse in the fracture. A fine grain is desired because the finer the grain or structure the stronger the metal. In forging a bar of manganese bronze or steel the granular structure is broken up and made smaller to produce a stronger metal. The amount of iron usually added in making manganese bronze is about 0.7 per cent. although this is sometimes run up as high as 1.50. Marine engineers object to the presence of more than one per cent. of iron in the alloy and claim that the presence of more than one per cent. causes corrosion in sea water.

Aluminum—Aluminum, as previously mentioned, is added to obtain fluidity of the metal in pouring. From 0.3 per cent. to 0.5 per cent. is a sufficient quantity to have present. An increase of the amount of aluminum does not give an increase in the strength. Some metallurgists claim that a larger amount of aluminum added than is necessary to obtain fluidity is undesirable because this metal oxidizes readily. The oxides become included in the metal producing a weaker alloy.

Manganese—Manganese is added as a deoxidizing agent; 0.3 per cent. is a sufficient quantity to have present in the alloy. When the amount is increased manganese adds hardness and strength but not to such a marked degree as iron. Some metallurgists employ a high percentage of manganese to impart strength to their bronze, using as high as three per cent. manganese. The writer uses iron to obtain strength and manganese as a deoxidizer. The amount of manganese in the alloy does not stay constant but "burns out" of the metal in two or three successive meltings.

Lead—Lead is a metal whose presence is not desired in bronze. Lead weakens the alloy especially in the presence of aluminum. In the manufacture of manganese bronze the best metals are selected because these metals are most free from lead. The maximum amount of lead permissible in manganese bronze is 0.2 per cent. The less there is present the better.

Copper—In the alloying and remelting of manganese bronze a certain amount of zinc is lost from the crucible through volatilization, the loss being about ¾ per cent. in each melting. This loss causes a decrease in the zinc with a corresponding increase of the amount of copper in the alloy. If the greatest strength is desired an increase in the percentage of copper is to be avoided, which is easily understood by referring again to the curve in Fig. 1. With the aid of chemical analysis the loss of zinc is determined for each heat and an amount of zinc equal to the loss of zinc is added to the crucible in the remelting of the metal before the bronze is poured. Due to this loss of zinc it is necessary to have the manufacture of manganese bronze under chemical control in order not only to obtain the strongest castings but to keep the composition uniform.

Table 2 gives the chemical analyses and physical tests of some castings, some of which were satisfactory, and others not. These results are given to show the effect chemical composition has upon the physical properties of manganese bronze. Numbers 1, 2, 3 and 4 are satisfactory both chemically and physically. Numbers 4 and 5 differ in the percentage of iron, otherwise they are quite similar in chemical composition. In numbers 6 and 7 the tin is too low. Alloys 8 and 9 contain too much copper and very little iron. In number 9, however, the high tin counteracts the effect of high copper and low iron.

Table 1.—Specifications for Manganese Bronze

	Copper, per cent.	Zinc, per cent.	Tin, maximum per cent.	Iron, maximum per cent.	Aluminum, maximum per cent.	Manganese, maximum per cent.	Lead, maximum per cent.	Tensile strength, lb. per sq. in., minimum	Yield point, lb. per sq. in., minimum	Elongation, in 2 in., per cent.
American Society for Testing Materials..	55 to 60	39 to 45	2.00	2.00	0.50	0.50	...	70,000	.....	20.0
Bureau of Steam Engineering, U. S. Navy	57 to 60	37 to 40	0.75*	1.00	0.50	0.30*	...	60,000	30,000	20.0
	56 to 58	40 to 42	1.00	1.00	0.50	0.30	0.20	65,000	30,000	20.0

*Percentages desired.

MANUFACTURE OF MANGANESE BRONZE

As stated in a previous paragraph only the best metals obtainable are used for making manganese bronze on account of the very small amount of lead present in the metals. The copper is melted first under charcoal. An alloy composed of iron, manganese and tin is placed on top of the charcoal and when heated to redness is pushed into the melted copper. The proper amount of aluminum is next added. The metal is well stirred. The union of the aluminum with the copper causes an increase in the temperature of the mixture at which temperature all of the iron-manganese-tin alloy should dissolve. The zinc is next added to complete the mixture. The iron-manganese-tin alloy com-

Table 2.—Chemical Analyses and Physical Tests of Manganese Bronze Castings

Test No.	Copper, per cent.	Zinc, per cent.	Tin, per cent.	Aluminum, per cent.	Iron, per cent.	Manganese, per cent.	Lead, per cent.	Tensile strength, lb. per sq. in.	Yield point, lb. per sq. in.	Elongation, per cent. in. 2 in.
1	57.66	39.85	0.84	0.58	0.69	0.15	Trace	73,885	.....	26
2	57.14	40.49	0.76	0.46	0.92	0.13	0.20	70,850	.....	32
3	56.09	41.63	0.80	0.44	0.70	0.32	Trace	79,500	.....	24
4	55.85	41.88	1.06	0.17	0.69	0.37	...	73,460	35,000	22
5	56.28	42.22	1.01	0.08	0.23	0.08	...	71,060	34,000	18½
6	56.86	40.17	0.41	0.55	0.26	0.08	0.20	65,300	31,000	26
7	57.52	40.96	0.30	0.48	0.56	0.11	0.07	67,300	27,500	34
8	58.00	40.70	0.78	0.32	Trace	0.30	0.00	65,650	28,800	29
9	58.02	40.17	1.29	0.15	0.18	0.15	0.04	69,100	32,500	25

monly called "steel alloy" is made by melting together wrought iron, and ferromanganese. When melted the tin is added to lower the melting point of the alloy. The proportions used are the following: —Wrought iron, 18 lb., ferromanganese, 4 lb., tin, 10 lb. These proportions can be varied, of course, to obtain a convenient alloy for any composition of manganese bronze. Using the steel alloy is the most popular method for introducing iron into manganese bronze.

Another method for introducing the iron consists in plunging thin iron plates into the melted copper and causing the iron and copper to unite directly. The difficulty experienced in using this method lies in keeping the surface of the iron plates clean or free from oxide. Iron and copper unite readily when both reach the same temperature in the crucible at about 2300 deg. F. provided the surface of the iron is perfectly clean. If not, the iron is left undissolved and when it reaches the surface of the metal there is further oxidation of the iron which renders combination with the copper impossible. No difficulty is experienced in the use of this method when galvanized sheet iron of about 0.03 in. in thickness is used. Galvanized sheet iron is made of the best open-hearth iron and furnishes a splendid form of iron. Strips of the sheet iron about 2½ in. wide are bent into the form of a spiral and plunged into the melted copper. The covering of zinc is immediately dissolved off the iron allowing a clean surface to be exposed to the copper. The iron is not allowed to become exposed above the surface of the copper. When the temperature of the copper reaches approximately 2300 deg. F. solution of the iron takes place. The manganese is added before the iron is introduced in the form of manganese-copper (carbon free). This alloy is placed on top of the charcoal and when red hot is pushed into the copper. The aluminum is added after the iron preferably in the form of aluminum-zinc in which form it combines more quietly with the metal in the crucible than when used in the form of the metal itself. The tin and zinc are added after the aluminum-zinc. After the last piece of zinc has alloyed with the metal, the whole heat is thoroughly stirred, the crucible is removed and the metal pigged. The alloy of manganese-copper, obtainable on the market, can be had as the following compositions:

Manganese-copper: Manganese, 28 to 30 per cent.; iron, 2 to 3 per cent; remainder, copper.
Manganese-copper, carbon free: Manganese, 30 per cent.; copper, 70 per cent.
Manganese-ferro-copper, carbon free: Manganese, 30 per cent.; iron, 20 per cent.; copper, 50 per cent.

Manganese bronze is always remelted to obtain a homogeneous alloy and to free any included oxide in the metal. The first mixing is done in the crucible by means of the stirrer; the second when the metal is poured into the chills; and the third mixing is done when the pigs are remelted in the crucible. After the last pig of metal has melted the temperature of the metal is allowed to rise to the proper casting temperature (1800 to 1900 deg. F.), then removed from the furnace to the mold and cast.

MANGANESE BRONZE FROM OTHER ALLOYS

In large manufacturing plants high grade brass stock material is cut up for manufacture into many products. In the process of manufacturing these products waste material is always produced. Ordinarily this waste material (tubing, sheet brass, etc.) is turned over to the foundry as scrap brass to be used for brass castings. When a laboratory is connected with the plant a greater value can be placed upon this scrap material since it can be made into manganese bronze. This waste material was originally made of the best metals obtainable and is composed of copper and zinc with an occasional small amount of tin present. When this material arrives at the brass foundry it is melted and cast into pigs. Brass turnings are treated in a similar manner. A chemical analysis is made of each heat. The metal of those heats that contains more than 0.20 per cent. of lead is allowed to go into the manufacture of brass castings. Those heats that contain less than 0.20 per cent. of lead are reserved for the manufacture of manganese bronze. When using brass for bronze a bath of melted copper is first made to dissolve the "steel alloy" or iron and manganese-copper, then the brass pigs are added and lastly the proper amount of aluminum or aluminum-zinc, tin and zinc necessary to give the correct composition to the alloy. Sometimes the brass contains sufficient tin to give the desired percentage of tin to the manganese bronze after the mixture has been made; sometimes it contains more and sometimes less. All calculations are based upon the chemical analyses of the brass heats. In Table 2, tests 1 and 2 were made on manganese bronze made from scrap brass. The results obtained show satisfactory metal.

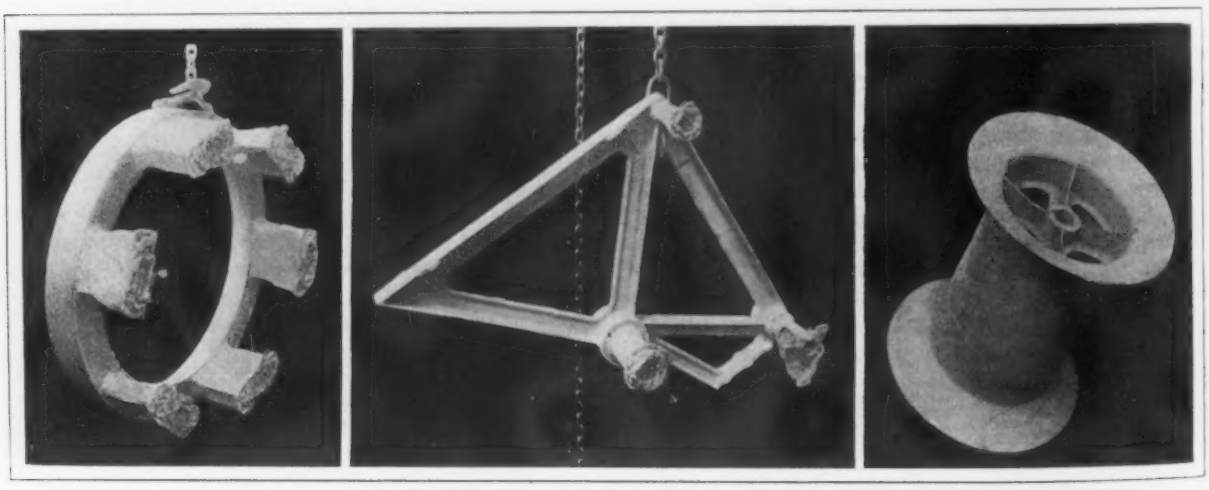


Fig. 2.—Types of Castings Made in Manganese Bronze

MANGANESE BRONZE CASTINGS

When changing from a fluid to a solid state manganese bronze like all strong metals shrinks in the mold. On account of this shrinkage skillful molding is essential to obtain sound castings. The molding methods will not be discussed in detail.

It will be sufficient to state that risers are placed on heavy parts of a casting to furnish metal to the casting when the metal shrinks. Where no risers can be used chills are placed at the thickest parts of the casting. Fig. 2 shows three types of manganese bronze castings. The one to the left is a gear blank with the gate cut off and is representative of a class of heavy castings made of this metal. The other two show castings that are typical of a class where lightness and great strength are required. In the central one the ribs and flanges are ⅛ in. in thickness, and risers are shown at the heaviest parts of the casting. The other light casting is a hoisting drum for a large racing yacht. The dimensions are, length, 36 in.; diameter of drum, 18 in.; thickness of top and bottom rims, 3/16 in.; thickness of drum, ⅜ in. Chills were used at the thickest parts of this casting.

CONCLUSIONS

Considering the scope of application of manganese bronze it is easy to conclude that it can compete with other non-ferrous metals where strength and cost are important considerations. It can also compete where strength and lightness are important factors due to its great tensile strength and the thin sections into which it can be cast.

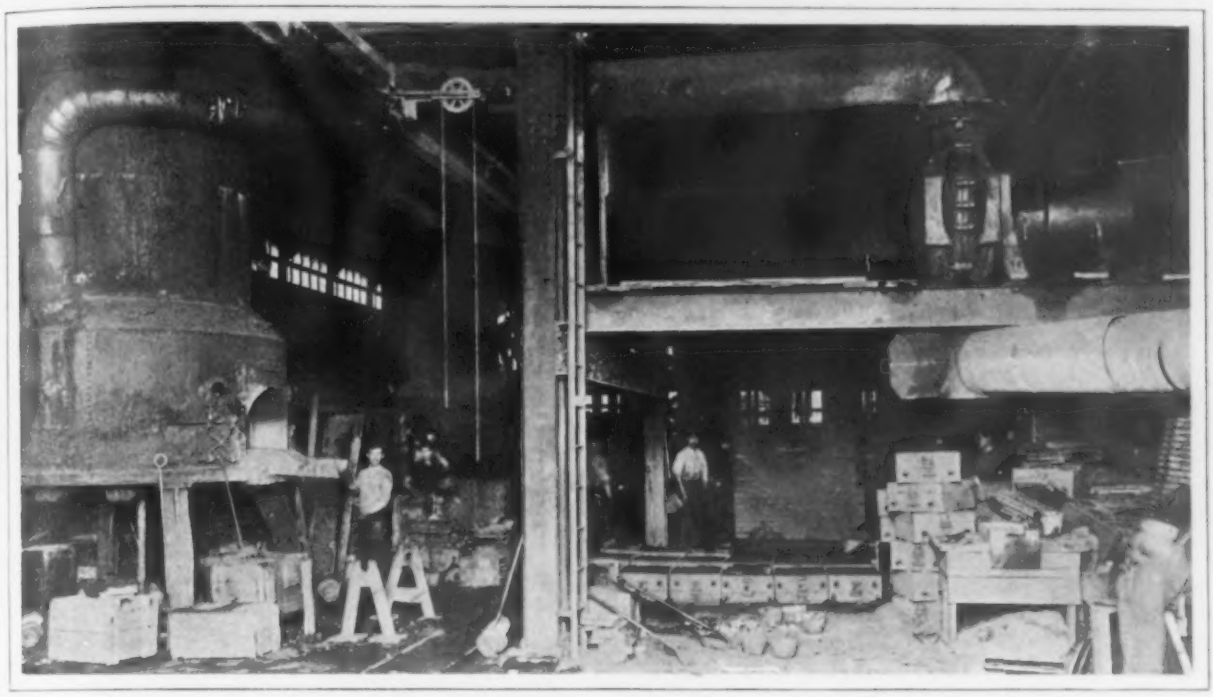
It has been shown that there can be practically but one composition for a copper-zinc alloy if an alloy of the greatest tensile strength is desired and that additions of small amounts of other metals improve the casting qualities and increase the strength. Manganese bronze can be correctly named a brass. Where scrap brass is of such quality that it can be converted into manganese bronze, such scrap becomes a valuable source of profit.

First Ship to New York by Panama Canal

The first all-water trip from San Francisco to New York via the Panama Canal was completed August 26 by the Pleiades of the Luckenbach Steamship Company, which flies the American flag. She left San Francisco July 24 and passed through the canal August 16. The Pleiades is one of 10 steamships that will ply between New York and San Francisco.

Air Compressor for Blowing Cupolas

The General Electric Company, Schenectady, N. Y., has developed a centrifugal air compressor, shown in the accompanying illustration, for blowing a 10-ton foundry cupola. It has a capacity of 4500 cu. ft. of free air per min. and is designed to deliver the air at a constant pressure without fluctuation, a condition calculated to provide a steady descent of the charge and uniform melting in the cupola. The compressor will be shown at the Foundry and Machine Exposition next week in Chicago.



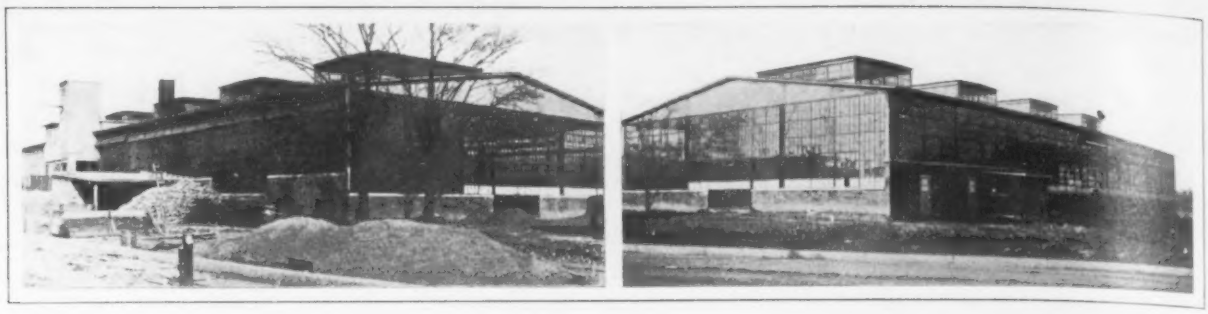
A Motor-Driven Centrifugal Compressor Supplying Air to a Foundry Cupola

An arc welding outfit, which is also to be exhibited, is a new one of the portable type and comprises a 10½-kw. motor-generator set and panel mounted on a truck. The length of the arc is relied upon to vary the voltage impressed across the arc automatically and the polarities of the electrode and the casting are also interchanged when the function of the electrode is changed from heating the break in the casting with carbon to filling it with iron or vice versa.

A number of motors will be loaned to other exhibitors for direct driving of different machines used in foundries and machine shop practice. Among these will be a reversing, adjustable-speed, direct-connected drive planing machine.

A Considerate Trade Circular

E. S. Jackman & Co., Chicago, agents for the Firth-Sterling Steel Company, McKeesport, Pa., have issued a circular designed to reach American buyers who have been satisfactorily served by tool steel makers of other countries, but have found that the war may seriously interrupt their foreign supply. The circular states that Firth-Sterling competition with the steels of the world has been a friendly rivalry of quality and good will and an inspiration to advance the company's product to the highest standard of merit and uniformity, adding this kindly proffer: "If, during this period, when business connections of long standing have been forced apart, we can help such shops to continue their work and usefulness, we shall be glad to respond with our best efforts and in the true American spirit that the misfortunes of others will be of short duration."



Cincinnati Foundry Company's New Foundry

A Notable Example of the Modern Glass House Used for the Industries—Scrap Breaker Among the Equipment Features

A striking example of what modern factory construction may provide in the way of generous daylight illumination, with the valuable advantages of facilitating accurate work and of minimizing accidents, is obtained in the new foundry which the Cincinnati Foundry Company has erected at Winton Place, Cincinnati. In a single structure 82 x 190 ft., with the sidewalls about 20 ft. high above the ground level to the eaves, there are no less than 9600 sq. ft. of glass surface, or about $1\frac{1}{2}$ sq. ft. of floor area to 1 sq. ft. of window area. The ends of the building have the greater percentage of glass surface, but while the roof is a single pitch roof from a central ridge, there are four lanterns or monitors crosswise of the building with glass in all four upright surfaces of these monitors. There are two longitudinal lines of columns within the building, making a main bay 31 ft. wide, over which the monitors are, these being 31 x 20 ft. Each side bay is thus about 25 ft. wide. The building is consequently a lofty, well-lighted structure and the glass surface, which is composed of Fenestra metal frames with plain not wired glass, is provided with movable sections as usual for natural ventilation.

The maximum inside height of the main bay is about 27 ft. and there are traveling cranes in all three bays, equipped with air hoists. The clearance under the roof trusses of the main bay is about 22 ft. and under the roof trusses of the side bays about 19 ft. The building as at present erected comprehends an extension, when desirable, and the cupola is located in one side bay nearer one end than the other, so that with an extension the cupola may come close to the center, longitudinally, of the building. The accompanying illustrations will give some idea of the appearance of the building, inside and out, although the interior view was taken on a cloudy day.

The walls are erected on a concrete foundation of 7 to 10 ft. high to the general grade of the floor, and above the foundation is a brick base wall, 4 ft. 10 in. high, above which rises the glazed section. Gables above the glass ends are finished in plaster. Attention may be called to the sliding steel

Interior of the New Foundry of the Cincinnati Foundry Company, Winton Place, Cincinnati

doors, at each end, each 6½ ft. wide and 10 ft. high, of steel plate in the bottom and glass above. One door in each case is provided with a smaller hinged door, so that the large doors need to be opened only when large castings are taken from the building.

At the location of the cupola there is a reinforced concrete elevator shaft extending beyond the building line, as indicated in one of the exterior photographs. This is equipped with a hydraulic elevator for carrying coke, pig iron and scrap to the mezzanine or charging floor of the cupola. Water is received from the city lines at 185 lb. pressure, so that no pumping equipment was needed for the elevator service. An interesting point in this connection is that the waste water from the elevator is discharged into a cistern so that it may be circulated through the cooling jackets of the gas engine which forms the motive power for the power demands of the foundry. The elevator is also interesting from the point that it is used to operate the scrap and pig-iron breaker. An I-beam projects outward at the top of the elevator shaft and to this is attached rigging for hoisting a 200-lb. drop weight. The weight is raised by the elevator, a cable being attached to its bottom and passing through a sheave pulley at the base of the elevator shaft. As the elevator can be operated from the ground, the arrangement is a convenient one, demanding only one man to break up scrap and pig iron and convey them to the charging floor. The cupola is a Whiting of 10 tons capacity. Bins for scrap, pig iron and coke are located near the elevator shaft, so that the handling cost is reduced to a minimum.

The main bay of the foundry is, of course, for the larger work. Metal is poured from the cupola into a main ladle and for transporting it there are two industrial railroad tracks and the complement of air hoists. In the side molding bay hand pouring is employed. The compressed air supply is obtained from a Chicago pneumatic air compressor, driven by a 85-hp. Miller gas engine. The air is compressed to 85 lb. pressure and besides six air hoists which are installed, the air is used for chipping hammers and like apparatus. The hoists in the main bay are of 5 tons capacity and those in the side bay of 3 tons.

A hot water heating system is installed with pipe coils along the sides of the building. It is the intention to utilize the heat of the exhaust gases from the gas engine as well as the jacket water in this work. A small auxiliary boiler will suffice when the heat from the engine is not available, as on holidays and at the beginning of a day's run.

A rule of the company which is rigorously enforced and which has a large bearing on the safety question is that the two molding bays of the plant in particular must be cleaned up thoroughly before a cast, all empty flasks and other litter being removed. After the six or more months the foundry has been in operation, it is stated that the workmen are decidedly contented and their efficiency has been increased by the light and attractive surroundings provided. The building is located approximately northwest by southeast and only a few shades are required to exclude the sun in hot weather.

The Canada Carbide Sales Company, 30 Church Street, New York, has been incorporated to market in the United States carbide made by the Canada Carbide Company, which operates factories at Shawinigan Falls, Que., and Merriton, Ont. It is establishing service stations in this country for this purpose.

Motor-Driven Patternmaker's Machine

The combination patternmaker's grinding and roll sanding machine of the Gardner Machine Company, Beloit, Wis., which was illustrated in *The Iron Age*, May 28, 1914, has been improved by the addition of a motor drive. The machine consists of a disk grinding wheel with an adjustable work table which can be adjusted to an extreme position of 45 deg. on either side of its normal horizontal position and a fixed horizontal work table with an angularly adjustable sanding roll. The sanding rolls are furnished in a standard length of 7 in. and the diameters are 2, 3, 4 and 6 in. They can be tilted to any angle up to a maximum of 45 deg. on either side of the perpendicular and there is a reciprocating motion of 5/16 in. which is relied upon to assist in the rapid removal of the stock.

The machine is driven by a 5-hp. motor, which is inclosed, the power being transmitted to the main spindle by a silent chain. A friction disk is provided for operating the sanding roll and there is a clutch lever so that it may be stopped and started at will, provided the main spindle is in motion. The silent chain and the other moving parts of the machine are incased by guards. The starting box is mounted directly on the front of the base where it is in a convenient position for the operator. The weight of the whole equipment is 3300 lb.

Swedish Iron and Steel in 1913

The year 1913 was in several respects a record one for the Swedish iron industry, according to Consul Emil Saur, Goteborg, Sweden, in Daily Consular and Trade Reports. The blast furnaces turned out 735,000 metric tons of pig iron or 33,100 tons more than in 1912. The production of blooms amounted to 153,400 tons, an increase over 1912 of 5300 tons. Bessemer ingots totaled 115,700 tons or 8400 tons more than in 1912, while open-hearth ingots and castings were 467,100 tons, an increase of 66,000 tons over 1912. The exports of iron and steel from Sweden in 1913 amounted to 502,600 metric tons or 10,000 tons more than in 1912. Despite heavy production and exportation, imports of iron and steel and certain manufactures thereof were 263,600 metric tons in 1913 or 22,600 tons over 1912. Ball bearings constitute an important Swedish industry. Statistics of export and production are not available, but exports to the United States in 1913, as invoiced at the Goteborg consulate, amounted to $321,885 as against $196,705 in 1912.

The production of pig iron by the electric process in Sweden in 1912 was 17,561 metric tons, of which 5402 tons were made at Trollhattan, 7796 tons at Hagfors and 4363 tons at Domnarfvet.

Large Iron-Ore Output of Alsace-Lorraine

The growing importance of Alsace-Lorraine as a producer of iron ore is shown in the statistics for 1913, which give the output as 21,135,554 metric tons, as compared with 20,083,238 tons in 1912, an increase of 1,052,316 tons. This tonnage was taken from 48 mines in 1913 as compared with 50 in 1912. The sales of iron ore from pits in that country aggregated 21,153,328 metric tons in 1913 and 19,907,689 tons in the preceding year. The destination is shown as follows:

	1912 Tons	1913 Tons
Alsace-Lorraine	10,774,741	11,786,964
Saar	2,676,531	2,812,418
Niederrhein-Westphalia	3,014,166	2,909,606
Luxembourg	2,768,004	2,896,226
France	467,621	517,079
Belgium	206,626	237,035
Total	19,907,689	21,153,328

Employees in the iron-ore mines in 1913 numbered 17,713 as compared with 17,151 in 1912.

Iron ore heads the list of Sweden's exports. In 1913 the exports to foreign countries, chiefly England and Germany, amounted to 6,440,000 tons.

The Molding Sand Problem Is Important

More Complicated Also Than Many Foundrymen Think—Characteristics Best for Various Classes of Work—Bonding and Tempering

BY DR. RICHARD MOLDENKE

One of the differences between European and American foundry practice is seen in the surface appearance of the castings made. Americans are so prone to overlook the non-essentials in their productive activity that the general run of castings here have acquired a reputation for inferior surface finish even if they are everything to be desired in strength and machinability. As the purchaser of castings is becoming more familiar with what it is possible for the foundry to turn out, he is becoming more exacting; now, for instance, castings cleaned by sand blast are regularly specified. As the sand blast shows up the casting surface mercilessly, foundrymen are beginning to look about for means to avoid excessive rejections.

Naturally the molding sand used receives the first attention. In the light casting line, where extreme care is essential, the fine sands of France and Belgium are occasionally imported at great cost, and certainly they give excellent results. There is no reason, however, why our American sands should not answer, were only special attention given to their preparation as demanded by the requirements of the case. A short discussion of the properties of a first-class molding sand would therefore be in order.

CHARACTERISTICS OF GOOD MOLDING SAND

Molding sand, rammed up to form the container for molten iron, brass, etc., must be non-yielding, permeable to gases, capable of resisting high temperatures readily, and after serving its purpose the mold must be easily destroyed. Moreover, the sand should be of such a texture that the surface of the casting is smooth and free from blemishes chargeable to the mold.

To be non-yielding and yet easily permeable to gases seem almost diametrically opposite characteristics and to understand why both are possible it is necessary to examine the composition and general character of the material closely. When the granites underwent the weathering action of ages, the original components—quartz, feldspars and micas—became dissociated. The quartz portion remained intact, while the feldspars and micas decomposed. Under the grinding action of water, the grains of quartz became rounded, forming our present day sand; the weathering of the feldspars gave us kaolin, which when washed away and collected elsewhere formed clay banks; and the micas that may have remained intact were washed away, being very light. The result of the whole situation was an aggregation of sand grains, more or less rounded, and partly or entirely covered with a small percentage of clay, more or less free from undecomposed feldspars.

According to the size of grain, the shape of the particles, the fatness of the clay, its amount, etc., will the molding sand be more or less valuable to the foundry.

SIZE AND SURFACE OF SAND GRAIN

Take first the sand grain. The smaller this is, the finer the surface of the casting will be. The sharper the grain, the denser it will pack, and the more non-yielding the surface of the mold becomes. As the effect due to ramming, however, does not extend inward as far as it would in the case of round grains, though the latter will not pack as tightly, and as, moreover, a sharp grain and consequent dense mold surface prevent the proper escape of gases, the rounded grain in molding sand is to be preferred.

Again, unless the size of the grains is very uniform, it stands to reason that the finer grains will fill the voids between the coarser ones, and thus the venting property of the sand is impaired. A sand should be examined, therefore, as to its size of grain, the finer sizes being used for light castings, where smooth surfaces are essential, and where from the nature of the case fewer gases are formed and a great permeability is not as necessary as for heavy work. For heavy work a coarser grain size is desirable, and care should be taken that this is uniform also. Here is the first point for improvement by the sand merchants. An investigation of a great number of samples indicated very plainly that nature has not sized its sand beds very closely. As in ore dressing the closer the sizes of mineral can be differentiated the more perfect will be the recovery of values, so also in foundry practice a very evenly sized molding sand can stand the punishment of inefficient labor much better without serious loss of castings, than a sand already prone to lack venting qualities when closely rammed.

TEMPERING

Along with the above problem comes the question of tempering with water. Some sands require more water than others to develop their full strength. Presuming that the clay bond is evenly distributed about the sand grains, it is necessary to give enough water to the molding sand to get this clay to stick the sand grains together. It is well known that some clays are exceedingly sticky, or fat, and others have almost no adhesive power at all and are called lean. Observation has shown that a sand has its best combined venting power and strength when dried after the mold has been made. This accounts for the smaller losses when the same castings are made in dry sand as against green sand. Disregarding the strength of a sand, its venting power is best when just a little water has been added, as this seems to lubricate the sand grains for air or gas in passing by them. Increase the water, however, to get the best strength when tempered, and the venting power goes down. Too much moisture greatly retards venting and in addition gives other troubles.

Disregarding the venting power of a sand, its best strength is brought out when the least amount of water necessary to temper it has been used. Since this also corresponds to the best venting of the tempered sand, as contrasted with dried sand, it follows that too much water should not be used on the sand heaps in any case.

THE BOND

From what has preceded it will be noticed that the clay bond of a molding sand is a most important

item. A sand carrying, say, 30 per cent. of clay which has little bonding power may not be as good as another with but 12 per cent., but with high bonding power. In fact the latter condition is much to be preferred, as clay being very fine in structure is very apt to fill up to voids between the sand grains, if present in large quantities. The bonding power, measured by the fatness of a clay, is readily ascertained in the laboratory by observing the degree of dye-absorption. The fatter, the more dye absorbed, and hence the possibility of a quantitative determination. Here is a second point for the sand merchant—artificially to strengthen the bond of the sand he sells by grinding in a fat clay, provided his natural sand is not already too heavily charged. In fact, this is the basis of making artificial molding sands as well as reworking old sands in the foundry to save hauling away too much refuse. Further, with a sand carrying too high a percentage of either a lean or fat clay, it is perfectly possible to grind in a quantity of sand free from clay, thus reducing the clay percentage. After this a fat clay can be added or not, as the case may require.

Foundrymen, particularly those who have reciprocating conveyors in use, often have trouble with their sand, the bond being separated from the sand and balled up in small lumps. The result is that the quartz grains are no longer tied together, the stream of iron cuts the mold badly, and in serious cases copes will not hold up but keep dropping as fast as made. Regrinding the sand restores the bond and watching the operation of the conveyor to regulate the speed to the point of minimizing this shaking apart of clay and sand corrects the evil.

Mention has been made of the origin of molding sands, the clay bond resulting from the decomposition of the feldspars in the original granite. Unfortunately this disintegration is never complete, and hence a molding sand always contains a greater or less percentage of the feldspars, which from their composition are readily fusible at high temperatures. It is therefore not only necessary that the clay in a molding sand should be fat, so that it has a good bonding power, but it should be as free as possible from the fluxes present in the shape of feldspars. Here, of course, it is again a question of the class of castings to be made. Molten iron for very light work sets so rapidly in the mold that the fluxes in the sand have no opportunity to become pasty and stick to the metal as an enamel. In heavy casting work, however, this can occur, and hence the importance of a careful selection of the sand used. The famous Albany sands are notably rich in feldspars, and hence are very poor for heavy work. They are seldom heard of in foundries other than for light work.

Where a molding sand carries much in the way of fluxes, little can be done to correct it. If the sand is very fine, it will not matter so much. If coarse, it had better be left alone.

JUDGING SAND BY RATIONAL ANALYSIS

In judging a sand, the so-called rational analysis is far better than the ultimate. That is, a division into quartz, clay substance and feldspars gives one a fairer idea of the value of the sand than the percentage of silica, alumina, iron oxide, potash and soda, etc. A quick test to determine which of several sands will answer best—provided all sands are known to be safe for foundry use—can be made by shaking equal quantities of each with a given amount of water, and letting them settle. This gives a rough idea of the proportion of sand and clay. Next an equal quantity of sand is shaken up with a given very small quantity of malachite green, in a given amount of water, and the degree of absorption observed. The sand running about 20 per cent. clay, and having this very fat, is apt to be the best.

An investigation of many sands in actual use gave as the average rational composition the following: Quartz, 65.53 per cent.; clay substance, 21.73 per cent., and feldspars, 12.74 per cent. This, recalculated to the ultimate approximate analysis gives: Silica, 84 per cent.; alumina (and iron oxide) 14 per cent., and alkalies 2 per cent. The alkalies and the iron oxide are the fluxing ingredients. That there is a wide range in the composition of molding sands is shown by the maxima and minima in the case of about 100 molding sands investigated. The quartz content runs as high as 88.7 per cent. and as low as 45.6 per cent.; the clay substance 41.2 and 8.9 per cent.; the feldspars 32.4 and 2.3 per cent. When the sands are classified for their fineness, these glaring differences are eased up considerably, as a sand with an abnormal percentage of feldspars would hardly be serviceable for heavy work. The same might be said of heavy clay percentages whether the clay be of good or poor bonding value.

As the average rational composition of molding sands does not reveal the wide variations of the individual sands, so also the bonding value of the clay in the sands is subject to great fluctuations. Thus, the richest clay in the sands, when compared with an equated amount in the poorest specimen had 4.7 times its bonding value. In the case of averages, the Albany sands were found to have the leanest clays, the Illinois, Missouri, Ohio and Kentucky sands having clays that were of bonding value respectively 2.6, 2.3, 2.2, and 2.0 times as great.

VARIATIONS IN STRENGTH

Astonishing fluctuations are also found in the strength of molding sands when tempered and subsequently dried. Numerous tests of sand pillars 1 in. square and 2½ in. high, with a load applied on the top illustrated this very nicely. When the sand was tempered with 5 per cent. of water, these columns would support on the average 4½ lb. before failing. With 7½ per cent. water to temper the sands, the strength dropped to 3¼ lb., and with more water still lower. Drying the tempered sands raised the strength on the average to about 12 lb. Individual cases, while following the above averages fairly close for the tempered material, gave as much as 60 lb. strength in the dried state before failure. Even in the tempered sands the fluctuations were so great that some sands when rammed as in ordinary squeezer practice would not support more than ¾ lb. while others would support 10 and 12 lb. It can be imagined what a difference this must make in molding, and why Mr. West at one time advocated the adoption of a standard consistency of the rammed sand in every shop in order to get uniform casting results. Here is another instance of possible improvement in molding sands. To so enrich poor sands that when tempered and made up into molds they will resist penetration by a punch of standard size when weighted by a given number of pounds.

The bending strength of molding sands, tempered as well as dried, shows similar results, though in much slighter degree. Some sands when made up into 1-in. square bars on supports 4 in. apart could not be handled without breaking. Others could support ¾ lb. at the center when tempered, and 4.5 lb. when dried, before failure.

EFFECTS OF HIGH TEMPERATURE

Finally comes the question of high temperature effects. The percentage of fluxes present will give a fair idea of what a sand will stand with a given thickness of section on the part of the casting made in it. A mineralogical investigation of many sands —in some cases over 15 varieties of minerals being present—shows the feldspars to be the bulk of the material present other than sand and clay. Feldspars being fusible, there is not only a chance of sintering, but also an excellent opportunity for heat to affect the sand for a considerable distance into the mold body. This is most important when viewed in connection with the water of crystallization present in an active clay—that is, in a new molding sand. Remove this water, by raising the temperature above 450 deg. F., and the bonding value of the clay is gone. The sand becomes inert or "burnt" and is no longer safe. The less refractory a sand is by reason of a higher fluxing content, the further the heat is conducted into the sand beyond the point of separation commonly recognized in the foundry by the sand layer adhering to the casting when it is shaken out. This sand layer should not be returned to the sand piles in any case, as it is absolutely inert, the hydration of the clay being destroyed by the heat of the molten metal. But with heavy fluxing percentages this destruction of the bond may extend much further, and unless the sand piles are very well mixed trouble is certain to result. It is a question whether the universal practice of having an inch or more of "facing sand" close to the pattern in making molds does not get its value from the new sand—and therefore safe sand —introduced, rather than from the sea coal. In making light castings, particularly malleable work, where comparatively lower temperatures in molten iron prevail, sea coal and facing sand are dispensed with. The molten metal sets so quickly, as the work is thin, that surface difficulties as met with in heavy gray iron work are not encountered. Lest the above be misunderstood by the practical foundryman, it should be stated that a ladle of white hot iron of low silicon content (as for malleable work) has a lower actual temperature than a molten high silicon gray iron of dull red appearance. The melting points of the two are different.

The obvious lesson from the above is that the foundryman should pay strict attention to his sand heaps so that through careless shaking out of castings there may not be introduced in spots a lot of burnt or at least damaged sand which has no business there. No amount of attention on the part of the sand merchant will correct this evil, for which he usually gets the blame, it being strictly up to the foundryman.

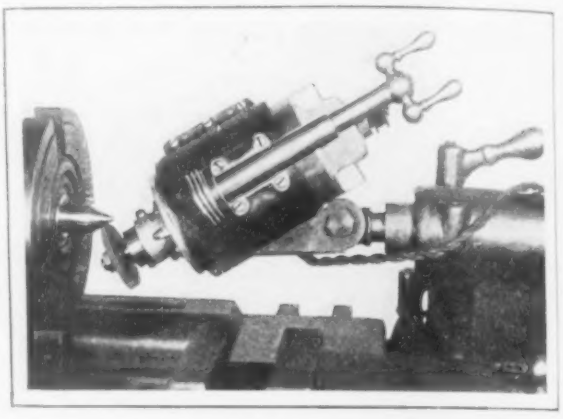
From the several points discussed in this article it will be seen that the sand problem is far more complicated than it is usually thought to be. However, once the underlying principles are understood, there is no reason why those interested in furnishing foundrymen this commodity should not improve it materially over the present condition, or why foundrymen, in turn, should not know how to specify what they require.

The Granite City Rolling Mill, a department of the National Enameling & Stamping Company, at Granite City, Ill., resumed full time operations Monday, August 31, giving work to more than 1000 men who have been idle more than a month. Nearly all the steel plants east of the river at St. Louis are working full time or preparing to do so as fast as the men can be put on, according to reports now being made by the various managements.

Portable Lathe Center Grinding Machine

For grinding the centers of lathes to a uniform angle of 60 deg., the Neil & Smith Electric Tool Company, Cincinnati, Ohio, has developed a portable electric grinding machine. In using this machine no work is required on the part of the operator, as the machine is placed in the tailstock, as shown, and the taper shank which is furnished brings the spindle of the grinding machine at the proper angle to grind a 60-deg. taper on the headstock center.

The power for operating the grinding wheel is taken from the nearest electric light socket, the current being supplied through a flexible connection. The wheel is fed backward and forward along the surface of the center by the double handle. This handle transmits its motion through a worm at the opposite end and the rack on the central portion of the machine. In grinding centers, the rests and the tool posts are removed from the lathe, so as not to interfere with the operation of the grinding wheel, and the headstock spindle is rotated by power, while the grinding wheel operates by power in the opposite direction. The taper shank that fits in the tailstock has a standard size shank at the end, which fits into the standard size hole in the grinding machine. By purchasing a number of taper shanks corresponding to the various sizes of the lathes it is possible to grind all the lathe centers in a plant to uniform 60-deg. angle and keep them accurate.



A Recently Developed Portable Electric Grinding Machine for Lathe Centers in Position for Grinding the Headstock Center

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Valveless Engine Utilizing Diesel Principle

The Harris Patents Company, 328 Chestnut street, Philadelphia, Pa., has developed a valveless internal combustion engine of the Diesel type. An advantage claimed for the engine is that it will start the load the same as the steam engine. The engine is of the marine type and is designed for use both on shipboard and on land. It is emphasized that cold high pressure air is not admitted to the working cylinders, which is due to the fact that the piston of the scavenging cylinder is an enlarged extension of the main piston working in its own cylinder below the working one. These cylinders and step pistons play a prominent part when the engine is being reversed or started on compressed air. The cylinders automatically become converted into air motors by the cutting out of the suction and delivery valves and the air starting valves are brought into play to keep the engine running under the action of the compressed air on the step pistons instead of on the main ones. The engine continues to run on the compressed air in the scavenging cylinders until it is desired to admit fuel to the main cylinders. An air pressure of 175 lb. can be used for starting the engine instead of the customary one of 800 to 1000 lb.

Automatic Surface Grinding Machine

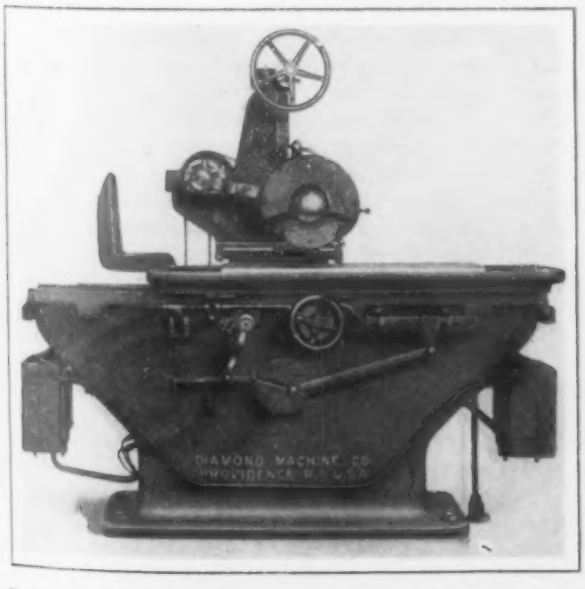
For use in the grinding of all kinds of dies, scale beams and parts, jigs and fixtures, finishing milling machine tables, grinding knives and general and miscellaneous surfacing work, the Diamond Machine Company, Providence, R. I., is building an automatic motor-driven surface grinding machine. The special features of it are an open side construction and the use of a unit casting for the column, bed and bracket, the latter being relied upon to eliminate vibration.

The bed and the column are reinforced by internal webs and the ends of the latter are brought out to do away with any overhang of the working surface of the table. The ways have large oil pockets and rollers and consist of a V in front and a flat way in the rear. The solid table pad has three T-slots planed and milled in it and the water used in grinding is removed by troughs, the shape of which is calculated to prevent any water from remaining on the table. The table reverse mechanism is assembled in a unit type case on the bench and is bolted in place.

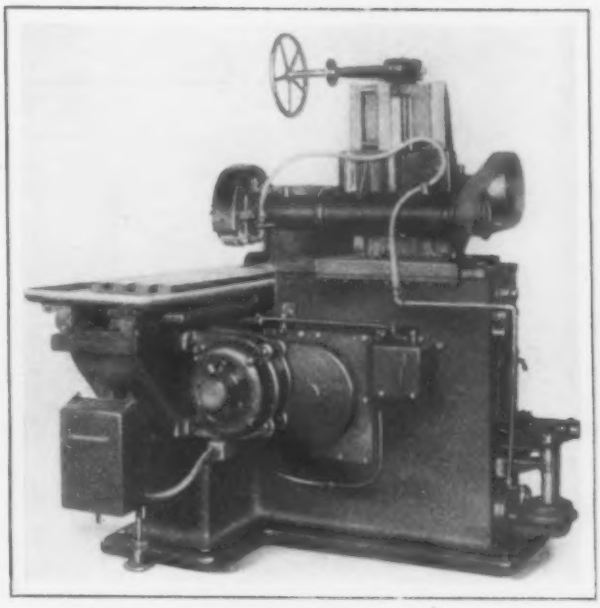
The machine is driven by two motors, a 2-hp. which operates at a speed of 1200 r.p.m. to drive the spindle, while the other, which is a 1/2-hp. unit of the reversing type, operates at 600 r.p.m. to drive the table. The spindle drive is by belt from a drum fastened to the motor shaft direct to a pulley on the driving shaft, an idler being relied upon to keep the belt at the proper tension. From the driving shaft a second belt runs to the spindle, the same as in a belt-driven machine. The reversing motor transmits its power through a cloth pinion, idler gear and bronze pinion, to a gear on the feed pulley shaft. The spindle speed is constant at 1633 r.p.m., while the speed of the table is 21 ft. per min.

The cross feed, which is either by hand or automatic, ranges from 0.005 to 0.09375 in. One revolution of the cross feed handwheel moves the head upright 0.333 in. and one revoluton of the elevating handwheel raises the saddle 0.05 in.

The spindle is made of 0.50 per cent. carbon steel, turned and ground to size and lapped into split phosphor bronze taper bearings. The diameter of the spindle is 1 5-8 in. in the front bearing and 2 in. in the rear one. The front bearing is 6 1-2 in. long and the rear one is 8 in. in length, and both



Front View of a Motor-Driven Automatic Surface Grinding Machine



Side View of the Machine Showing Mounting of Motor

are adjusted by hardened nuts running in counterbores in the tight flanges and the pulley. A hole cast in the saddle gives access to the thrust adjustment which is made by a collar.

All the table and cross feed levers and handwheels are located at the front of the machine. The table travel can be stopped at any desired point when the table is operating under power and hand movement is obtained by a crank. The length of table travel is determined by adjustable dogs and a clutch is provided to prevent the simultaneous engagement of hand and table feed when the machine is operating. The elevation of the saddle and the emery wheel is controlled by a large handwheel which operates through spiral gears. This handwheel can be adjusted in a horizontal plane to bring it into the most convenient position for the operator.

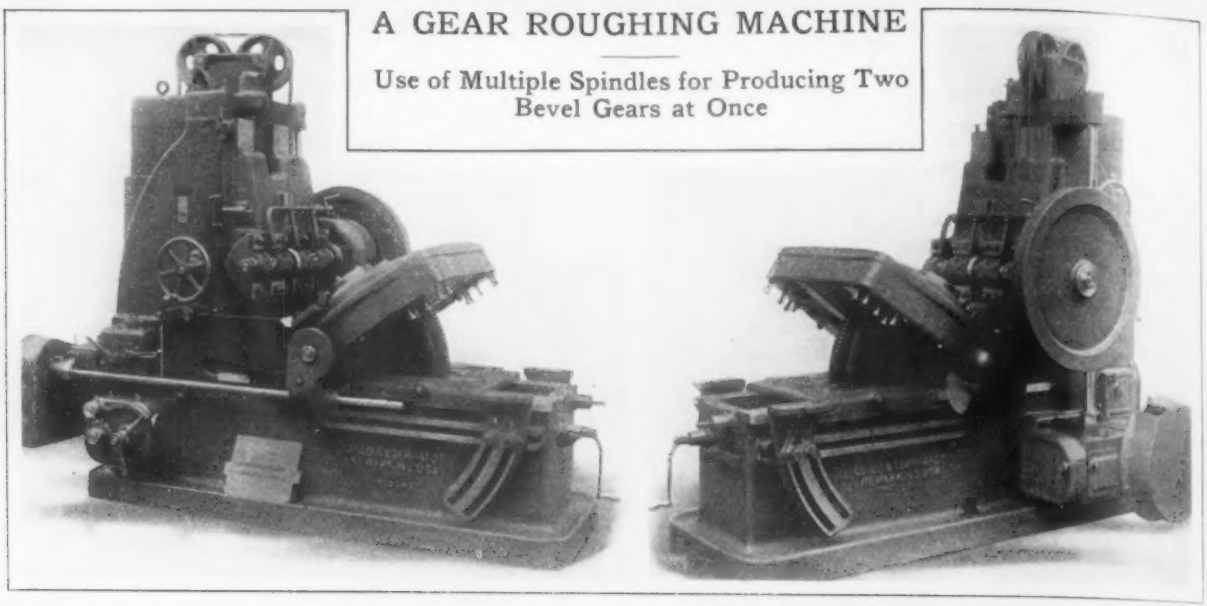
A vertical-spindle centrifugal pump operating at 1200 r.p.m. provides a supply of water for the work, the amount being varied by a valve at the pleasure of the operator. The water nozzle, which is arranged for the attachment of a 3/8-in. rubber hose, is adjustable. A sediment pan is hung inside the column and the base of the column itself forms a large water tank. A drain permits the water in the main tank to be drawn off if desired and a door located in the rear of the column provides for the removal of the sediment pan.

The guarding of the gears and moving parts has received special attention and all of the gears are inclosed. The emery wheel is protected by a guard with a removable side for changing the wheel quickly and adjustable flaps for the wear of the wheel. The spray produced by the grinding operation is kept from falling on the floor by a water guard at the end of the table. Safety flanges having a diameter equal to half that of the full size emery wheel, which is 12 in., are used.

The Cleveland Engineering Society, Cleveland, Ohio, will pay a visit to Detroit September 12, where it will be the guest of the Detroit Engineering Society. The Cleveland engineers will take the night boat for Detroit September 11 and return the following night. Inspection visits will be made to the Ford and Packard automobile plants and to the new plant being erected by the Edison Illuminating Company. Following a banquet in the evening an address will be delivered by one of the Detroit automobile experts. A number of entertainment features will also be provided.

A GEAR ROUGHING MACHINE

Use of Multiple Spindles for Producing Two Bevel Gears at Once



A 12 x 48-In. Vertical-Cutting Type Gear Cutting Machine Arranged with Multiple Spindles for Roughing Out Bevel Gears

A new size of machine for cutting either spur or spur and bevel gears has been added to the line of vertical gear cutting machines built by Gould & Eberhardt, Newark, N. J. It is capable of cutting spur gears 60 in. in diameter with a 16-in. face and spur and bevel gears up to a maximum diameter of 48 in. and 12 in. across the face. As shown, it is arranged with a multiple-spindle head attachment for roughing out two large bevel gears simultaneously. This size machine is intended for roughing out bevel gears used in the manufacture of automobile trucks, where the work is too heavy for the smaller sizes of machines formerly built. It can be used for cutting either cast-iron or steel gears, the capacity being $1\frac{1}{2}$ diametral pitch in cast iron and 2 diametrical pitch in steel.

The general design of this machine is the same as the smaller sizes of the company, having a positive indexing mechanism, a quick change feed gear box, where it is possible to secure 16 changes arranged in geometric progression without removing any gears, a safety lever mechanism whereby the movements of the cutter slide and indexing of the work table are interlocked, and one cannot operate while the other is in motion and the single-pulley drive. The base and stanchion are of the same design as the smaller size machine, and are cast in one piece. This construction is relied upon to provide a rigid stanchion on which the cutter slide can be mounted. The base is broad and supports the work table, which when furnished for cutting bevel gears has rigid supports on each side that are capable of adjustment to suit the various angles of the table. In addition to the worm and worm sector, these two supports are relied upon to hold the work rigidly in the angular position.

The vertical cutting or anvil principle, upon which the machine operates, it is emphasized, works out well in this larger size machine, as the heavy gear blanks when resting in a horizontal position can be held securely and rigidly for cutting. The weight of the blank is evenly distributed over the table, and the entire rim of the blank is thoroughly supported. When two bevel gears are being roughed out simultaneously they are mounted rigidly on the tilted table and the entire rim or face of the blank is backed up by hardened plates. The employment of the vertical cutting principle, it is pointed out, requires the use of one tilting slide less than if the cutter slide tilted as would be necessary if the work were on a horizontal mandrel. The cutter slide is designed with great length to give a long, narrow guide to the cutter. This arrangement tends to maintain a more permanent arrangement of the cutter slide, while the large-diameter flywheel on one end of the cutter spindle is relied upon to steady the cutter and increase the efficiency of the machine.

A New Type of Portable Light Hoist

For light lifting and for use as a portable hoist for mines, manufacturing plants, power houses, railroad shops and shipyards the Ingersoll-Rand Company, 11 Broadway, New York City, has placed on the market a portable hoist. Some of the uses to which this hoist may be put in manufacturing and power plants are the moving of light machinery, the hoisting of ashes and other waste material and for loading trucks, freight cars, etc. In the foundry it can be used for moving heavy weights, as by reason of a light weight, 300 lb., it can be readily taken to any desired location. All of the gears and shafts are covered, the only exposed moving part being the drum. This, it is emphasized, is a desirable feature for underground operation where the light is none too good and there is danger of the workman's clothing or body being caught in the machinery.

The main base of the hoist is arranged so that it can be bolted to a timber, and a cap that comes with the hoist enables it to be fastened to a support of circular cross-section, such as a mine column or a pipe. The motor or engine is operated by compressed air or steam and is of the reversible square piston type, giving four impulses per revolution. It is emphasized that there are no dead centers and the engine will start in any position. The drum is mounted independently of the engine shaft and is operated through the medium of a clutch and gears. A worm-operated hand brake also forms a part of the equipment.

Referring to the front view of the engine, which is shown in the small insert in the accompanying illustration, the engine is at the right, the brake and the drum in the middle and the gearcase at the extreme left. The lever on the left controls the gears and the clutch, while the one on the right controls the direction of operation and the bottom lever regulates the application of the brake. The operator can vary the speed of hoisting at will and when the throttle is released it will return automatically to the central position, thus shutting off

the power and stopping the hoist. This feature, it is emphasized, enables one man to handle haulage work, as he can leave the control lever and carry the rope to the car.

The diameter of the drum is 6 in. with a clear space of 7 in. between the flanges, which is sufficient to accommodate 700 ft. of ¼-in. rope or 450 ft. of 5/16-in. rope. The capacity of the hoist is 1000 lb. of a rope speed of 85 ft. per min. and an operating pressure of 80 lb. The amount of floor space required by the hoist is 16½ x 21¼ in. and the hight is 20⅛ in.

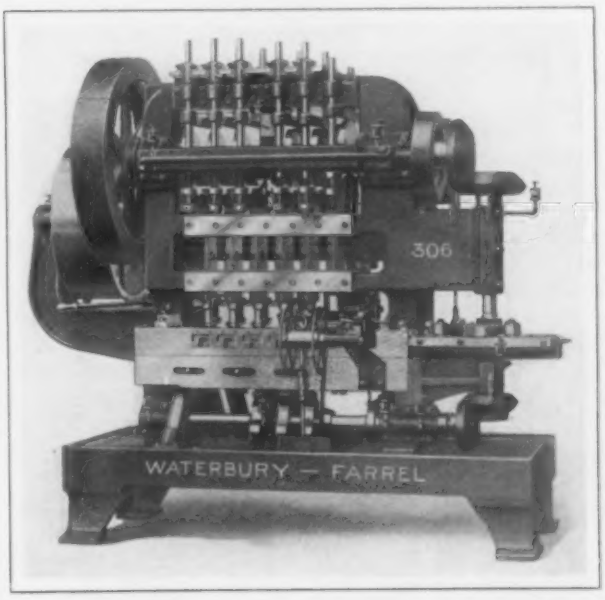
View of a Recently Developed Portable Hoist for Moving Light Machinery, Cars, Etc., and the Hoist in Use

An Improved Automatic Eyelet Machine

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has made a number of improvements in its line of eyelet machines. Among the changes may be mentioned an adjustable cam transfer motion, adjustable strippers and a wedge adjustment for setting the tools. Although these machines are called eyelet machines and this was the use to which the first ones that were built 40 or more years ago were put, at the present day they are used for the automatic production of a large number of articles from sheet metal, such as collar buttons, umbrella fittings, glove and garment fasteners, button parts, pencil shells, lamp fixtures, camera and typewriter fittings, cartridge primers, etc.

The construction of these machines is essentially that of a multiple press. A number of plungers are built into a single frame, each performing a special operation, with a carrier to transfer the article in the various stages of manufacture from one position to the next. As all of the operations are performed practically simultaneously, it is pointed out that the expense of handling, annealing, etc., is eliminated. The machines are built in seven sizes, with a specified distance between the plungers and a standard stroke of the cams up to six plungers, but a greater number of plungers can be used if desired. The minimum number of plungers recommended by the builder is four, although three-plunger machines are sometimes found desirable for certain classes of work. The standard machines have from four to eight plungers, although machines with nine or ten have been built for special work. The six-plunger construction is the one that is generally used, as this permits five operations after the blanking, which is generally sufficient for ordinary requirements. The width of the material used depends upon the diameter of the blank to be cut, but it is not recommended that more than three rows of small blanks be cut from a single strip on account of the warping of the stock.

In operation the metal in strip form of uniform width is placed on a reel in front, passed over a lubricating sponge box and through a guide to a pair of intermittent ratchet feed rolls back of the blanking die. While the feed is at rest the first or blanking plunger cuts out the blank on its downward stroke and carries it through the die into a pocket in the transfer slide, a reel at the back coiling up the scrap as it is delivered by the feed rolls. The transfer slide then moves to the left by the action of the side camshaft, carrying the blank to the second plunger, where it dwells until this plunger, with its forming punch, comes down and draws the blank through the transfer slide and into the first cupping die. The transfer slide now recedes, and on the up stroke of the second plunger a knock-up, actuated by a cam motion on the lower shaft, pushes the shell out of this die and into a pair of fingers held in the transfer slide, the punch continuing upward to clear the top of the shell. This operation is repeated as often as is necessary until the finished article drops from the machine. A number of special attachments can be supplied which enable additional operations to be performed if desired.

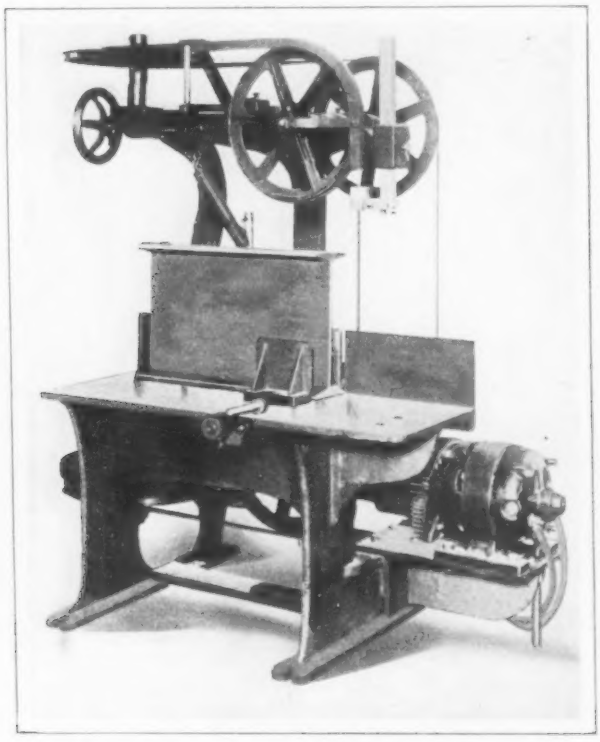


One of a Recently Improved Line of Eyelet Machines for the Automatic Production of Articles from Sheet Metal

All-steel cars are being experimented with on several railroads in India. Metal freight cars have long been in use, but passenger cars have usually been built of teak wood resting on steel underframes. The wood warps, swells and shrinks owing to climatic conditions and the cars become out of plumb and more or less dangerous. The rise in the price of teak and the cheapening of steel have rendered the use of the latter possible.

New Type Metal Band Sawing Machine

As a substitute for a cold metal sawing machine and a grinding machine for sharpening the saw, H. C. Williamson, 1840 West Lake street, Chicago, Ill., is offering a metal band sawing machine. Simple construction, ease in operation and rigid construction are the special features claimed for this machine. Ample adjustment is also provided to take care of the shortening of the blade due to the repairing of breakage if this should happen and the power consumption is small. Among the work which can be handled by this machine is the cutting of tubing, tool steel, bars, axles and I-beams.



A Band Sawing Machine for Metal Having a Somewhat Unusual Arrangement of Guiding Wheels

The blade is carried 16 in. to the rear of the table by the arrangement of the guiding wheels, which, it is emphasized, enables any length of stock to be cut off. The swing frame on which the saw is mounted is rigid in construction and carries a saw guide which can be used, although it is stated that this is seldom required. When the machine is not in use the frame stands upright, but in starting a cut the operator takes hold of a handle at the top and front of the frame and brings the saw to the work, after which it feeds by gravity without any attention on the part of the operator. When the cut has been made the power is cut off automatically and the saw is returned to a vertical position. The movement of the blade is retarded by a spring which gives an even pressure all the way down. The pulleys on the machine are flanged to prevent the blade from running off the guiding wheels. The table, which is 20 in. from the floor, is drilled and tapped for strapping on special work, and a swivel back and vise are furnished for cutting at any angle. The back and the vise can be removed if desired, thus giving a plain table measuring 14 x 36 in.

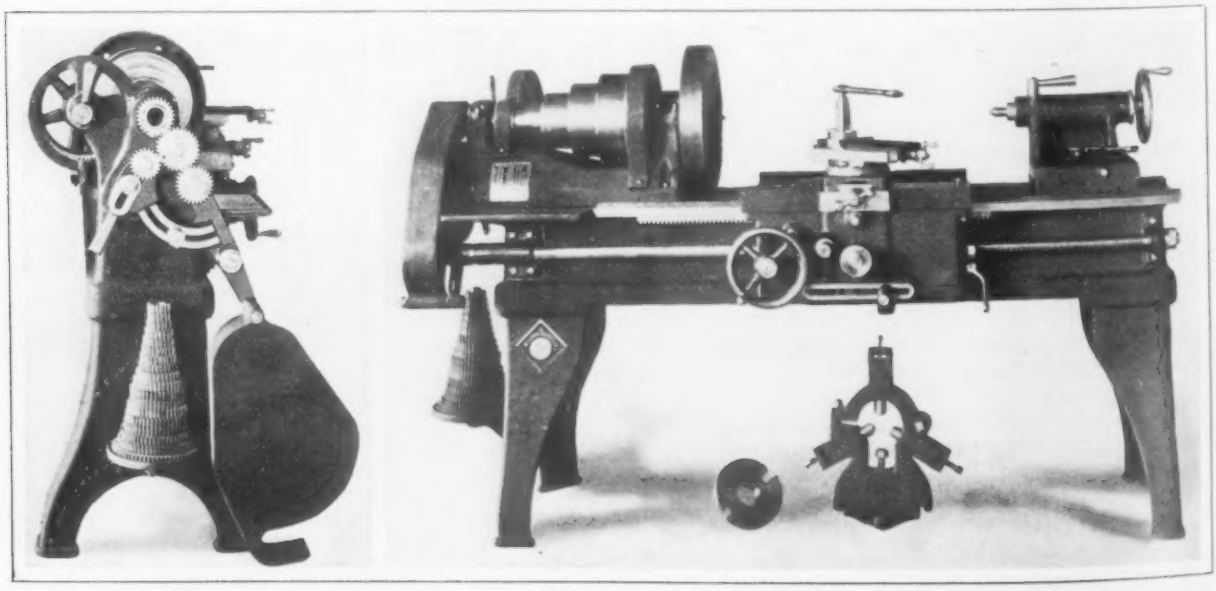
The drive is by an electric motor, the power being transmitted through a gear and pinion from the driving motor to a horizontal driving shaft under the table. The large driving gear also acts as a pulley. If desired, the machine can be furnished equipped for belt drive.

In tests made of the machine it has been found that approximately ½ hp. is required to run the machine, and a 3-in. round bar will be cut in 7 min. The time required for cutting off a tube 5 in. in diameter is only 2 min.

A 16-18-In. Screw Cutting Engine Lathe

A new product of the W. F. & John Barnes Company, Rockford, Ill., is a 16-18-in. screw cutting engine lathe. This form of designation is employed by the builder not to give the idea that the tool is of gap variety but rather to give the exact swing. It is intended for repair shop and general manufacturing work and the principal feature of it is the provision that is made in the apron for securing four changes of feed in either direction without changing the gears.

In general the construction of this new tool follows the builder's standard line. The lathe spindle has bronze bushed bearings and there is a hole 1⅝ in. in diameter extending entirely through the spindle. The head is backgeared in the ratio of 9¼ to 1. A lever movement to right or left gives four changes of feed without changing gears,



End and Front Views of a Recently Developed 16-18-In. Screw Cutting Engine Lathe Having Four Rates of Feed in Either Direction Available Without Changing Gears

the feed varying instantly from coarse to fine or vice versa and also providing an instantaneous reverse. The cross feed of the tool carriage is also operated in the same way. Any number of threads from 1 to 56 in. can be cut and the lead screw is 1 7/16 in. in diameter. The pitch of the steel rack employed for feeding the carriage is 7. The tailstock is of the cut-away type for convenience in using the compound rest and it also has a side movement for use in turning tapers.

The following table gives the principal dimensions and specifications of the lathe:

Length of bed, ft.	6	8
Swing over ways, in.	18	18
Swing over carriage, in.	12	12
Distance between centers, in.	32	56
Diameter of front bearing, in.	3	3
Diameter of back bearing, in.	2 1/4	2 1/4
Diameter of spindle nose, in.	2 5/8	2 5/8
Number of threads on spindle nose, per in.	6	6
Diameter of largest step of cone pulley, in.	10	10
Width of cone pulley steps, in.	3 1/8	3 1/8
Diameter of tailstock spindle, in.	1 15/16	1 15/16
Size of lathe tool, in.	5/8x1 1/4	5/8x1 1/4
Speed of countershaft, r.p.m.	200	200
Diameter of countershaft pulley, in.	10 7/8	10 7/8
Width of countershaft pulley steps, in.	3 1/8	3 1/8
Net weight, lb.	1,815	2,025
Crated shipping weight, lb.	2,010	2,300

The equipment regularly furnished with the lathe includes a compound rest and power cross-feed together with one large and one small faceplate, a center rest, two tool steel centers, a set of 18 change gears for cutting threads, a countershaft and necessary wrenches. If desired a taper attachment and a follow rest can be supplied at a slight extra cost.

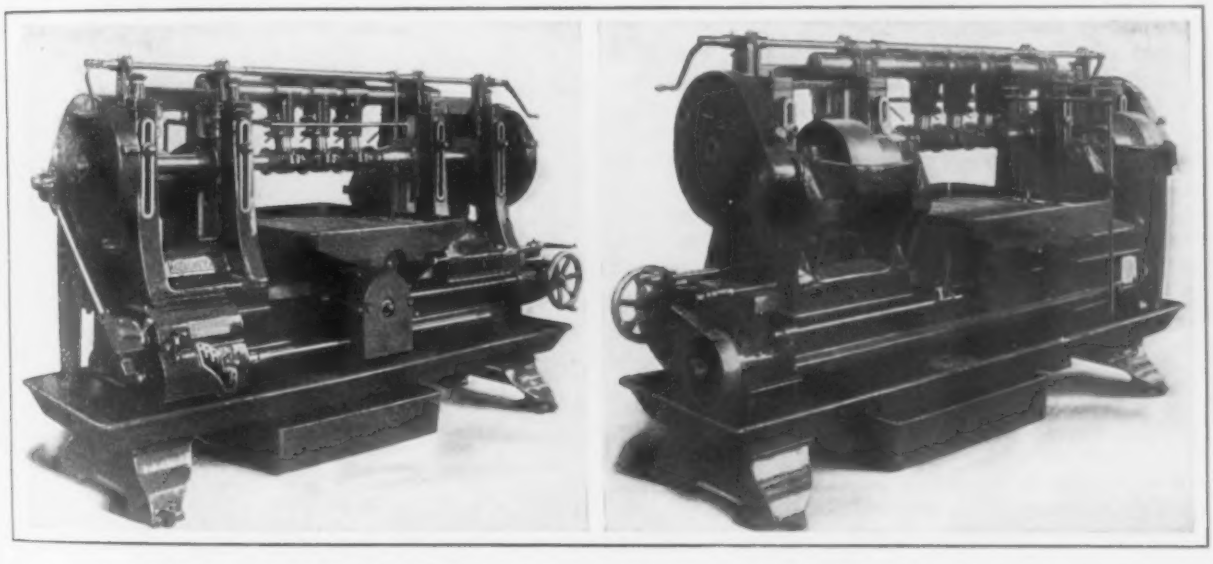
Heavy Rapid Production Milling Machine

The Hendey Machine Company, Torrington, Conn., has developed a heavy design duplex milling machine. This tool, which is designated as the No. 16 duplex Lincoln type, was designed for the rapid production of large quantities of work in manufacturing plants.

The bed, of massive construction, is extra wide at the top and can be supplied in several lengths. Square locks are used for supporting and aligning the headstocks and the saddle. The table is fitted with a power quick return, through gearing, of approximately 100 in. per min. High sides are provided to confine the cutter lubricant and a variety of working dimensions can be furnished for the table.

The main spindles of the machine have taper journals on the front running in annular bearings lined with Lumen metal. A No. 12 Brown & Sharpe taper hole is located at the front end of the spindle, which has a threaded hose. Reliance is placed on an arched bar that is cast integral with power shaft bearings to keep them in proper alignment on the guides and also act as a belt guard. The power shaft and the main spindle bearings are tied together by heavy connecting links to each head. These control the engagement of the gear train in the spindle drive automatically irrespective of the elevation of the spindles, which can be adjusted either singly or in unison. The gears are fully incased by guards, having compression grease cups for lubrication. The overhead arm or tie bar has three pendants for arbor support, all of which are fitted with split bearings hinged so that the lower portion drops down to facilitate the quick removal of the arbor.

The equipment furnished with the machine includes the customary fixtures and cutters. An oil pan, pump and the necessary piping can be supplied or omitted to suit the requirements of the purchaser.



The Operating and Driving Sides of a Heavy Duplex Manufacturing Milling Machine Designed to Turn Out Large Quantities of Work Rapidly

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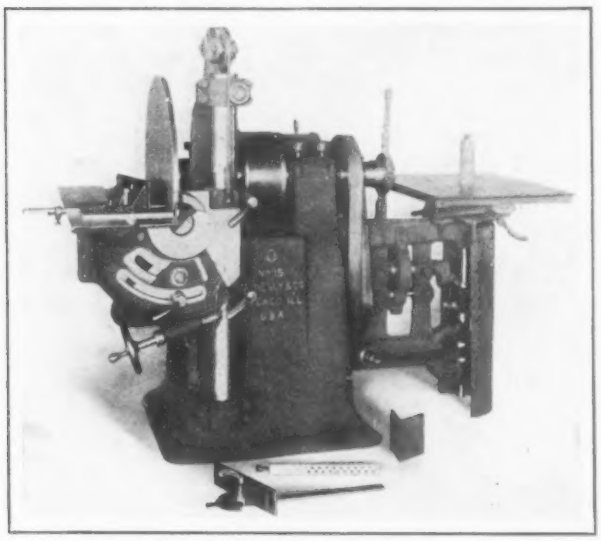
The Westinghouse Electric & Mfg. Company has again had at its East Pittsburgh works this summer a number of college professors engaged in regular shop and engineering work. This is the fourth year. Circumstances made it necessary this summer to postpone the beginning of the course from the date originally set, which had the effect of lessening the attendance because a number of the teachers had then made other plans for their vacations. These teachers were treated the same as the regular shop employees, and therefore had an excellent chance to gain practical first-hand information on the building of electrical apparatus.

The Gleason Works, Rochester, N. Y., is now erecting a new concrete office building and making other improvements. Additional shop floor space, 50 x 200 ft., will be provided.

Edgar Allen & Co., Ltd., 718-722 West Lake street, Chicago, Ill., with works in Sheffield, England, manufacturers of Allen's "K9" vanadium oil-hardening steel, announce that there has been no interruption in their tool steel shipments on account of the war in Europe. They have been assured that there will be no interruption in future shipments notwithstanding the rumors and statements to the contrary. Their stocks at 86 John street, New York, and at their warehouse in Chicago are such that they can make immediate shipments.

Grinding and Sanding Machine

An improved patternmaker's grinding machine, which combines in the single unit a disk grinding and a drum sanding machine, has been placed on the market by Charles H. Besly & Co., 118 North



The Operating Side of a Combination Disk Grinding and Sanding Machine for Patternmakers

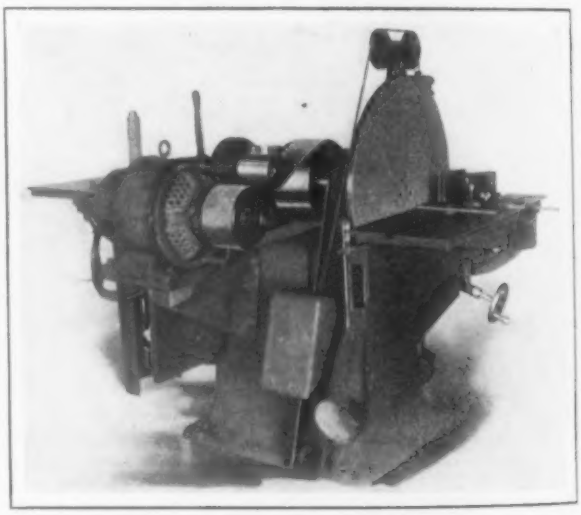
Clinton street, Chicago, Ill. This machine is intended for use on all kinds of pattern work and, it is emphasized, can also handle jobs that were formerly done on lathes and trimming machines as well as a number of hand operations. It is claimed that an apprentice can turn out as much work as was formerly done by a skilled operator and cheaper pattern lumber can be worked as the machine will grind any kind of wood as well as nails or screws that may form a part of the surface to be ground.

As the name of the machine indicates, it consists of a steel disk wheel for grinding flat surfaces and external curves and a drum sanding attachment for producing both straight and curved internal surfaces. The steel grinding wheel is 30 in. in diameter and ¾ in. thick. It is covered with a circle of garnet paper which is cemented in place without removing the wheel from the machine, it being pointed out that a worn out circle can be removed and a new one made ready for use in a short space of time. The spindle construction is the same as that of the builder's other machines of this type, provision being made for taking up all end play. The spindle is 2½ in. in diameter and 37¾ in. long. The hight of the spindle center is 38 in.

An adjustable work table 14 in. wide and 40 in. long is provided for the disk wheel. The table may be tilted by a worm gear handwheel and can be locked at any angle from 75 to 135 deg. from the plane of the wheel, large distinct graduations being provided to indicate its position. The table is hung from one end and tilts from an adjustable circular gibbed bearing, this construction being relied upon to maintain the edge of the table at a distance of 1/32 in. from the face of the disk wheel, irrespective of the angular position of the table top. In this way it is emphasized the angularity of the position of the table can be changed in one operation. A vertical adjustment of 25 in. is provided for the work table which may be swung away from the wheel for convenience in resetting the latter or for facing off extra large patterns. A single handle nut locks the table in position. Four attachments are furnished for the work table, the sizing circle gauge for grinding cylindrical or conical work like core prints, a sliding bevel gauge for square or beveled work, a sizing bevel gauge with an adjustable stop screw, so that work may be ground to size and duplicated and an angle plate for free hand cornering of thin work. All of these attachments lie in a groove in the top of the work table parallel to the face of the disk wheel.

The drum sanding attachment has a work table measuring 24 in. x 28 in. that can be tilted and locked at any angle from 85 to 105 deg. from the axis of the drum. There is a central angular opening, 8½ in. in diameter, in the work table into which are fitted circular plates to accommodate drums of various sizes. The drum shown in the accompanying illustration is 2½ in. in diameter and 4 in. long but it is possible to use drums ranging from 1 to 6 in. in diameter of any reasonable length. The speed of the sand drum is 2250 r.p.m. and there is a vertical reciprocating motion up to 4 in. to equalize the wear of the abrasive. A self-oiling friction clutch coupling is located between the grinding spindle and drum sanding attachment so the operator can stop the latter independently of the disk wheel.

The arrangement for mounting the motor on the back of the machine is shown in the rear view. A 3-hp. motor is used and is mounted on an angle plate at the back of the machine, the drive being through an endless leather belt. A wide belt is used to prevent slippage due to fine wood dust get-



The Rear of the Machine Showing the Exhauster and the Method of Mounting the Motor and Transmitting Power

ting on the pulleys and it is emphasized that this form of drive has proved more satisfactory than gears or a silent chain.

The first Cleveland Business Efficiency Exposition will be held in Cleveland, Ohio, November 14 to 21, by Cleveland Chapter, American Institute of Banking. This organization comprises more than 400 men active in bank work in Cleveland and it has been unusually successful in managing other public affairs in that city in past years. A unique plan to help make sales for exhibitors will be put into operation. The bank workers of Cleveland and the surrounding territory will cooperate to bring merchants, manufacturers, and other business men from the entire territory to the show. The exposition will consist of two parts, one for the display of apparatus and methods for eliminating waste and promoting economy and efficiency in business, and the other a graphic arts department for the display of commercial art, advertising, engraving, printing, fine papers and inks and allied products. The show is to be given in the Coliseum.

HARDENING STEEL IN A FORGE

A Comparison of the Results Secured with Those of the Lead Bath Method

BY ALBERT A. DOWD

Many factories use the lead bath system for hardening high-speed steel, and while this arrangement may be very convenient and save considerable time, it is more than doubtful whether the results obtained are really economical because of the variations in cutting efficiency, which are largely caused by this method of treating. Often a tool hardened in this way does not cut as it should and a test shows that it has not acquired the requisite degree of hardness, so that it must be sent back to the blacksmith shop to be rehardened.

Several years ago while making some tests of high-speed steels of various makes, to determine the most satisfactory results under very severe working conditions, I had occasion to visit the blacksmith shop to have some tools rehardened. While waiting for the blacksmith to finish the work he was doing I watched the hardening process with considerable interest. The blacksmith took a tool and warmed it for about ½ min. over the forge fire until he had taken the chill out of the steel and then plunged the cutting edge into a lead bath having a temperature of about 1500 deg. F. After it had attained a bright red color it was quickly removed to another lead bath, the temperature of which was kept at 2050 to 2100 deg., thus bringing the tool up to the required heat very rapidly, after which it was quenched in an oil and brine bath. I handed the tools which I had brought in over to the blacksmith and told him that they were soft and I wanted them rehardened as soon as possible. They were sent back to me, having supposedly been put through the same process of hardening as those which I had seen while in the blacksmith shop. After regrinding they were again tested and found wanting, being only a little better than before. This was very disappointing and looked as if the steel was not up to the mark. In order to make certain regarding the point, I decided to make another test with a couple of entirely new tools on the same piece of steel.

It has always been a fixed impression with me that a tool should be heated very slowly for hardening, because the rapid heating has a tendency to open up the structure of the steel to such an extent that the molecules are so separated that they become less tenacious. When quenched, a close grained structure is not obtained, and soft spots are very apt to be found while there is also a lack of cohesion that leaves the tool in such condition that it fractures easily and is therefore short lived. To test this matter, I asked the head blacksmith if he would handle them in a somewhat different way, as I wished to test the cutting of the two tools which had been hardened differently. The first tool was hardened by placing it in a forge with an ample supply of fuel between it and the blast nozzle and was heated gradually until the cutting edge had attained a bright red heat. The blast was then forced and the temperature raised quickly until the color had just verged on a pure white on the cutting edge about 2200 deg. F. It was then quenched in a bath composed of 25 gal. of paraffin oil and the same quantity of lard, and 1 bu. of salt. It should, of course, be understood that only the cutting edge was carried to the heat mentioned and the tool when being quenched was kept in constant motion, the cutting edge only being dipped in the solution at first, but finally the whole tool was immersed until cool. No attempt was made to draw the temper. The other tool was simply heated over the forge fire until it was well warmed through and was then carried to a bright red in the first lead bath and brought up to the final heat in the other, the quenching process being the same. The tools were marked for identification and were ground and tested.

GOOD RESULTS FROM HEATING SLOWLY

The test showed that the first tool was superior to any of the others which had been tested, while the second one was also considerably better than any previous lot. Tools which had been treated by the lead bath method in the first place were sent back to be rehardened by the forge method. After this, they were tested and gave excellent results. Among the points brought out by these experiments were that the structure of the steel was undoubtedly injured when the tools were heated too rapidly and also that the temperature of the highest lead bath fluctuated between 2000 and 2100 deg., as shown by the pyrometer test, the combination of these two factors having had such an effect on the tools that their efficiency was impaired. In the first place the structure of the steel was injured and in the second, the heat of the final lead bath was insufficient by from 100 to 200 deg. to give a heat sufficiently high for hardening. When using the fire end of the pyrometer in the high temperature lead bath it was noted that the needle of the indicator was so sensitive to even a slight movement of the blacksmith's hands as he tried the heat of the lead with the fire end, that it was difficult to determine the heat exactly, as the needle vibrated between 1950 and 2100 deg.

The heat was therefore increased until the needle fluctuated between 2100 and 2200 deg. and another tool was carried through by the lead bath method and showed a greater life and a much greater cutting efficiency. Although none of the tools hardened by this method were quite as good as those which were forge treated throughout, they were very much better than those treated by the original method and put into the first lead bath in a comparatively cool state.

There are some manufacturers who have dispensed with the lead bath in treating high-speed steels and use the forge method entirely, judging the heat by the color of the heated metal, and one of these obtained the hardest and longest lived tools I have ever seen. There was one high-speed tool which was used on chilled cast-iron tire molds with a feed of 1/16 in., a speed of 40 ft. and a chip ranging from ¼ to ⅜ in. for four months without regrinding. At the end of this period it was still in first-class working condition. This is a remarkable record for a roughing tool and I have never known it to be equaled. The tool was hardened by the forge method throughout and cooled in the solution previously mentioned.

The Otto Gas Engine Works, Philadelphia, is temporarily out of the market so far as its Diesel engine is concerned. The castings for these engines were made at the company's German works and shipped to the Philadelphia plant for finishing and assembling. The German plant is now closed down and it is not known how soon it will resume operations.

The Logemann Brothers Company, Milwaukee, Wis., is completing work on its new shops on the northwest side of the city and is contemplating removal from the present works on Oregon street this month.

Design of Ports for Open-Hearth Furnaces

The Position and Size of Air and Gas Supplies Giving the Best Efficiencies, Including the Furnace Using Oil for Fuel

BY HERBERT F. MILLER, JR.

The ports of an open-hearth furnace are one of the most important factors in determining the efficiency of the furnace. For it is in this part of the furnace that the union of the fuel and air commences and the direction of the flame is determined.

It is known that a hot working furnace, that is, a furnace which works so that the walls and roof are always at a high temperature, is not necessarily a fast working furnace; also, that most fast working furnaces have cool roofs and walls. In the first case the furnace that keeps the walls and roof hot has greater radiation than a furnace which has cool walls and roof. The case of the furnace that works cold because of cold gas and cold air is not considered. A furnace that works hot on the walls and

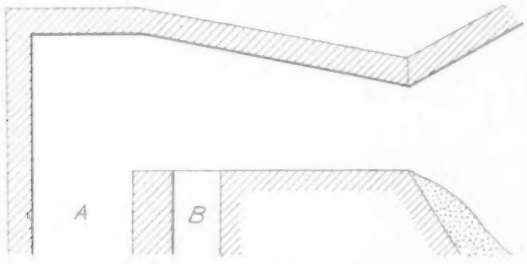


Fig. 1—Slope of Roof Covering the Ports

roof may work cold on the bath and thereby have a very high loss by radiation and escaping waste gases. It is in the size, location and design of the ports that the problem of efficiency remains.

In all open-hearth furnaces the flame should shoot down on the bath clear of the roof and stay that low until it goes out through the port at the other end of the furnace. The flame should be clear white from the time it leaves the port and should never be smoky in appearance. A smoky flame at any point means a cold working flame at that point, because of the poor combustion there. The flame should be in condition to work at highest efficiency from the time it leaves the port to the end of the flame.

The use of ports in open-hearth furnaces is for directing the air and gas so that there may be perfect combustion and the resultant heat applied on the material under treatment. Therefore, the object in designing the ports of an open-hearth furnace should be to cause the air and gas to unite at a high rate of speed and at the same time to concentrate and direct the flame down on the charge so that the flame at no time scatters toward the side walls and roof, and so that heating may be done by contact rather than by radiation.

Experiments on other types of ports and on different fuels have led the writer to believe that a greatly improved furnace using producer gas for fuel may be had by applying the same principles to that kind of fuel. Usually the gas comes out of the gas port at a higher rate of speed than the air comes from the air port. If then, we could speed up both air and gas so that the air and flame will come out of the port at a high rate of speed, under perfect control and burned enough to start working efficiently where the bath and port meet, we will have a furnace much superior to the present type using producer gas for fuel.

To do this it is necessary to have the gas uptake in front of the air uptake from which it is separated by a substantial water-cooled brick wall. The gas port arch extends just far enough to give proper direction to the flame, Fig. 1, and is of course, water cooled. The roof of the port covering the air uptake and gas port slants sharply so that the air shoots down on the gas and combustion begins to take place before the gas enters the hearth. The width of the port being slightly less than one-third of the width of the furnace and the entrance of the port to the furnace being about 30 per cent. less than the cross-section of the gas and air uptakes means that the air and gas will come together intimately and at a very great speed. This results in a flame of intense heat which being under perfect control is concentrated on the bath where it is needed, leaving the roof and walls in a relatively cool condition.

The objection that the reduction in the cross-section of the port at its entrance to the hearth will cause a slowness of draft in the furnace, is not borne out in practice. The writer has found that the same amount (approximately) of air and gas will go through the port in a given time (although at a higher rate of speed) as went through when the port was larger. The tendency has been to ease the flow of air and gases at all points in furnace construction, which is correct except at this one point (the port), where the pull of the furnace stack should be so utilized that the action of the air and gas will be like a blowpipe as the flame leaves the port and comes into the hearth. As the flame leaves the port it follows the natural tendency of gases and spreads over the bath evenly, and the whole surface of the exposed scrap is constantly melting under the concentrated heat instead of the oxidizing action on the end away from the entering flame so noticeable in most furnaces.

This design of port is distinctly different from the conventional producer gas port where the air is drawn in through the space between the gas port arch and the roof of the port which is as wide as the furnace and insures a comparatively slow union of the air and gas. In the open port type of furnace the above features hold true with the exception that there is but one uptake and that is for the air. The gas is introduced into the furnace through the sides of the port on to the bottom of the port. The roof of the port slopes down sharply compressing the air down on the gas and thereby keeping the flame down on the bath. The port is narrow, making a thick layer of gas, which would ordinarily mean poor combustion of the gas next to the bath where the heat is needed. This problem is taken care of by by-passing a small portion of the air through horizontal or inclined by-passages underneath the bottom of the port, as in Fig. 2.

Where fuels are used that are usually atomized, the flame is usually under control, but is traveling at a far greater speed than the natural draft of the furnace. The waste gases, in this case, pass into

the stack at a much higher temperature than when other fuels are used, due to the forced pressure of the flame. This defect may be overcome if the pressure of the air and oil is decreased so that the oil is forced out of the burner at a rate of speed no higher than the draft of the furnace. To do this, and still burn the oil economically, a property of the oil must be used that has not usually been taken advantage of heretofore, that is, using a slight pressure of air to break up the stream of oil somewhat and passing this over a rising current of hot air, the oil is flashed into a gas and then burned. It is necessary to explain that in ports for furnaces using liquid fuel there are two uptakes, one in front of the other (the one nearer the bath being the smaller), and the fuel passes through a water cooled burner which extends above, but not entirely across the uptake that is nearer the hearth, as in Fig. 3. Thus the air coming up uptake 1 forms a protecting layer of air between the roof and the flame, and the hot air coming up uptake 2 gasifies the fuel and furnishes air for combustion. This type of port will give the hottest flame possible and at the same time the flame will move at normal speed doing no more damage to the end walls and checkers than a natural gas furnace. This type of port is similar in size to the open port type, Fig. 2.

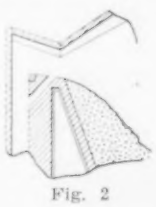


Fig. 2

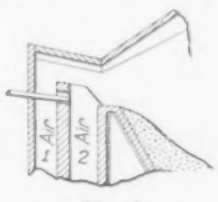


Fig. 3

The location of the port in reference to the bottom, bath level or slag line, and to the roof is very important. This feature materially affects the gas cost and speed of the furnace. For example, if the bottom of the port at the end next to the bath is on a level or nearly so with the slag line, the bottom of the gas layer will not burn well and the flame will sweep around the sides of the charge instead of around the sides and over the top, as it should do to get a fast melt. When the flame sweeps around the sides only of the charge, that part of the charge that projects above the flame is for a long time in contact with the preheated air only and because of this the period of melting down is much longer than it is when the flame entirely covers the charge, causing a uniform and unceasing melt.

Where the port is low the roof of the hearth must be sharply dropped to meet the roof of the port. This abrupt curve causes a drag on the flame and usually causes the flame to hang above the port entrance in the hearth chamber or make it whip to the roof or both. To overcome these difficulties the port is located symmetrically to the slag line and to the roof. This gives an even tension on the gas flame and puts the flame in position to melt the charge efficiently and does not wear the ends of the roof as rapidly as usual. The location of the port in reference to the bath and roof is important, as the speed of a furnace will vary 20 per cent. as this dimension is changed.

The writer has seen a furnace that normally made a heat in 4 hr. slow up 1½ hr. by lowering the whole port 7½ in. This was the only change made and when the port was restored to its former place the former speed of the furnace was regained.

The features outlined correctly applied to a natural gas furnace will reduce the consumption of gas per gross ton of steel produced from the usual amount of 6000 to 7500 cu. ft. per ton to about 3500 cu. ft. of gas for cold charges.

The time of the heats will be reduced proportionately.

IRON-ORE OUTPUT IN 1913

Largest Production Ever Attained—Increase of 6,830,290 Tons

According to statistics recently completed by Ernest F. Burchard, of the United States Geological Survey, the production and shipments of iron ore in the United States exceeded those of any previous year.

The crude iron ore mined in 1913 amounted to 61,980,437 gross tons, compared with 55,150,147 tons mined in 1912—an increase of 6,830,290 tons, or 12.38 per cent. The iron ore shipped from the mines in 1913 amounted to 59,643,098 tons, valued at $130,905,558, compared with 57,017,614 tons, valued at $107,050,153, marketed in 1912—an increase in quantity of 2,625,484 tons, or 4.60 per cent., and in value of $23,855,405, or 22.28 per cent. The average price of ore per ton for the whole country in 1913 was $2.19, compared with $1.88 in 1912.

These quantities of ore, both mined and marketed, include the iron ore used for fluxing other metallic ores at smelters in the Middle and Western States, but do not include the iron ore sold for the manufacture of paint. The iron ore marketed for paint in 1913 amounted to 16,950 tons, valued at $44,851. The ore reported as sold for fluxing purposes other than in the manufacture of pig iron amounted to 62,842 tons, valued at $235,588, in 1913, compared with 88,449 tons, valued at $244,315, in 1912.

The domestic iron ore actually marketed for the manufacture of pig iron amounted in 1913 to 59,580,256 tons, valued at $130,669,970, compared with 56,929,165 tons, valued at $106,805,838, in 1912.

The rank of the five States producing the largest quantity of iron ore—Minnesota, Michigan, Alabama, New York and Wisconsin—remained unchanged in 1913, but there were a few changes in the relative rank of certain of the smaller producers.

The Minnesota iron ranges are yielding at present considerably more iron ore than is produced in all the rest of the States together, having furnished 62.37 per cent. of the total for the United States in 1913. The Lake Superior district, comprising all the mines in Minnesota and Michigan and those in northern Wisconsin, mined 52,377,362 tons in 1913, or 84.51 per cent. of the total.

The Mesaba range produced 69.46 per cent. of the entire Lake Superior output and nearly 59 per cent. of the entire production of the United States. The Menominee, Penokee-Gogebic and Marquette ranges are next in importance, the Menominee producing in 1912 about 200,000 tons less than the State of Alabama, which is the next State in rank as a producer after Minnesota and Michigan. The Vermilion range, the fifth in importance of the six producing Lake Superior ranges, produced more ore in 1913 than New York, which is fourth in rank as a producing State.

The Geological Survey of New Jersey announces that the output of the mineral industry of the State in 1913 amounted to $40,715,061, or $323,453 more than in the preceding year. The total value of the zinc output was $9,421,664, a decrease of $204,527 from the preceding year, due solely to lower prices. Iron mining showed a decrease of $212,513, the value of the product for 1912 being $980,303. Of clay products, the most important branch of New Jersey's mineral industry, the aggregate value was $20,475,067, a decrease of $65,494 from 1912. The production of Portland cement showed an increase of $986,657 over the product of 1912.

A plan for the reorganization of the North Electric & Telephone Improvement Company, Galion, Ohio, is well under way and it is expected that the plant will be kept in operation.

The Foundrymen's Conventions in Chicago

The Meetings of Three Associations and the Exhibition of Foundry Equipment, Machinery and Supplies Next Week in Chicago

Another year of progress in the foundry industry will be recorded in Chicago next week when the contemporaneous meetings of the American Foundrymen's Association, the American Institute of Metals and the Association Foundry Foremen take place and when the exhibition of foundry equipment, machinery and supplies, which has come to be a permanent annual institution, is held. In earlier issues have been given the programmes of meetings of the American Foundrymen's Association, which deals with the scientific and practical in iron and steel castings, and of the American Institute of Metals, which is concerned with non-ferrous metals, while in the following is given a list in some detail of the exhibitors at the exposition, outlining briefly what may be seen at each exhibit. This is compiled in advance for such convenience as it may be to those intending to participate. It follows that the newest things and latest developments in the foundry are brought out at the exposition and naturally the advance made commercially as well as technically is developed in the meetings of the associations.

The exposition proper will be open to the interested public on Saturday of this week, September 5, and will remain so until the close of the association meetings, Friday, September 11. The association meetings are not scheduled to start until Tuesday morning, September 8, and as has been the practice, the opening session will be a joint one. Headquarters are at the La Salle Hotel, but some of the sessions will be held at the Stock Yards Inn, as explained in the programmes published in these columns. A condensed programme for the week is here given, but since the programme of the American Foundrymen's Association was printed in the issue of August 13, it is learned that G. R. Brandon, Harvey, Ill., is to read a paper before the Tuesday afternoon session on "A New Design of Foundry Cupola" and that at the cost congress session another paper has been added, this by E. A. Johnson, Wentworth Institute, Boston, entitled "The Training of Foremen, Superintendents and Managers of Foundries." A paper has been received also for the iron castings session, Thursday afternoon, from J. E. Johnson, Jr., New York, on "Materials for High Grade Castings."

The exposition is to be housed in the International Amphitheater Building, at Forty-Second street and South Halsted street, Chicago, where it was held last year. The feature exhibits are classified so far as possible as follows: Molding machines and general foundry equipment; welding and cutting apparatus; sand blast machinery and apparatus; air compressors and pneumatic tools; portable electrical tools; motor generators and controllers; overhead transmission and conveying machines; sand mixing and handling machinery; grinding machines and abrasives, and cranes and hoists, both electric and air. The north and south straight-aways will not be used this year, so that the exposition spaces will be quite concentrated.

The portraits on page 561 comprise officers of the associations interested in foundry week, as follows: the president, senior vice-president and secretary of the American Foundrymen's Association; and the president and secretary of the American Institute of Metals, of the Associated Foundry Foremen and of the Foundry & Machine Exhibition Company, the last being the organization which conducts the exhibition. Portraits are given on page 563 of representatives of the Chicago hosts.

Condensed Programme of Foundry Week

Tuesday, September 8.

10 a. m.—JOINT SESSION at La Salle Hotel of American Foundrymen's Association, American Institute of Metals and Associated Foundry Foremen, at which the presidents of these associations will deliver addresses and following this a

JOINT SAFETY SESSION for which seven papers are scheduled.

2 p. m.—SESSION ON FOUNDRY EQUIPMENT AND APPLIANCES, American Foundrymen's Association, La Salle Hotel. Eight papers scheduled.

2 p. m.—SESSION ON GENERAL PAPERS, American Institute of Metals, La Salle Hotel. Eight papers and reports scheduled.

7.30 p. m.—Lake ride, Steamer Theodore Roosevelt, dock foot of Clark street bridge.

Wednesday, September 9.

10 a. m.—JOINT COST CONGRESS, American Foundrymen's Association and American Institute of Metals, Stock Yards Inn. Nine papers scheduled.

1 p. m.—Ladies' luncheon, Stock Yards Inn.

2 p. m.—SESSION ON MALLEABLE CASTINGS, American Foundrymen's Association, Stock Yards Inn. Five papers scheduled.

2 p. m.—SESSION ON ROLLING MILLS, American Institute of Metals, Stock Yards Inn. Seven papers scheduled.

Thursday, September 10.

10 a. m.—SESSION ON STEEL CASTINGS, American Foundrymen's Association, Stock Yards Inn. Seven papers scheduled.

10 a. m.—SESSION ON METALLURGY AND METALLOGRAPHY, American Institute of Metals, Stock Yards Inn. Five papers scheduled.

2 p. m.—SESSION ON GRAY IRON CASTINGS, American Foundrymen's Association, Stock Yards Inn. Eight papers scheduled.

2 p. m.—SESSION ON MELTING PRACTICE, American Institute of Metals, Stock Yards Inn. Three papers scheduled.

7 p. m.—Banquet, La Salle Hotel.

Friday, September 11.

10 a. m.—BUSINESS SESSION, American Foundrymen's Association, Stock Yards Inn. Election of officers, etc.

10 a. m.—PROFESSIONAL SESSION, American Institute of Metals, Stock Yards Inn. Five papers scheduled.

12.30 p. m.—Sightseeing tour of industrial Chicago.

Exhibitors and the Products Displayed

Acme Machine Tool Company, Cincinnati, Ohio.—Combination 42-in. x 36-in. geared head flat turret lathe, motor-driven, in actual operation, turning out parts from bar stock as well as chucking work. Represented by Joseph M. Herrman and J. R. Pearson.

Ajax Metal Company, Philadelphia, Pa.—Ingot metals, including Ajax plastic bronze, manganese bronze, phosphor bronze, acid bronze, hydraulic bronze, steam metal, red and yellow brass; Ajax phosphor copper, manganese copper and silicon copper, Bull babbitt metal and genuine babbitt metal, etc. Represented by G. H. Clamer, W. J. Coane, H. L. Carpenter, Frank M. Willison and C. F. Hopkins.

American Pulley Company, Philadelphia, Pa.—Full line of steel split pulleys. Represented by J. Forrest.

American Tool Works Company, Cincinnati, Ohio.—In connection with the Essley Machinery Company will show 14-in. x 6 ft., 20-in. x 10-ft. and 36-in. x 14-ft. high-duty engine lathes; 15-in. and 24-in. high-duty shapers; 2-ft., 3-ft. and 6-ft. heavy-duty plain radial drills and 24-in. x 24-in. x 6-ft. planer, all designed for rapid production and driven by direct-connected motors in operation. Represented by H. B. Doan, Robert S. Alter, J. C. Hussey and C. K. Cairns.

Arcade Mfg. Company, Freeport, Ill.—Recent developments in the molding machine line, jolting and squeezing machines, core machines and a demonstration of the company's match plate process. Thirty types of molding machines will be shown. Represented by E. H. Morgan, Charles Morgan, L. L. Munn, F. N. Perkins, August Christen, G. D. Wolfley, W. C. Norcross, R. E. Turnbull, Henry Tscherning, F. E. Boedeker, B. C. Trueblood and Reeve Burton.

Armstrong-Blum Mfg. Company, Chicago, Ill.—Automatic high-speed hack saw machine, motor-driven; high-speed motor-driven hack saw machine for general work; belt-driven chop saws, hand drill press vises with quick acting jaw, combined hand sheer and punch machine and splitting shears, rod cutters and punches, all hand lever tools.

E. C. Atkins & Co., Indianapolis, Ind.—Complete line of metal cutting saws, consisting of circular and band saws, hack saw blades and frames and a general line of saws, also high-speed hack saw in actual operation. Represented by S. M. Perrigo, Elmer Heidlinger, W. deR. Knight and Lewis Okey.

Ayer & Lord Tie Company, Chicago, Ill.—Sample pavement of interior creosoted wood blocks, also blocks that have been taken from floors that have been in service various lengths of time, similar blocks from street pavement, etc. Samples of creosoted timbers for building purposes, etc. Represented by A. H. Noyes, B. S. McConnell, Frank A. Weaver, James Adkins, Jr., and E. L. Parvin.

Baker Brothers, Toledo, Ohio.—High-speed motor-driven drilling machine, key-seating machine and a gear box to show instantaneous speed changes.

Barnes Drill Company, Rockford, Ill.—Will show in connection with the Essley Machinery Company. Exhibit their new self-oiling 20-in. all-geared drill and tapper with motor drive in operation. Represented by A. M. Johnson, B. F. Barnes and J. E. Andress.

Battle Creek Sand Sifter Company, Battle Creek, Mich.—Standard Simplex and Duplex foundry sand sifters. Represented by R. R. Wilder.

Benjamin Electric Mfg. Company, Chicago, Ill.—Unit air compressors, automatic air valves, punch press safety devices, and a line of industrial electric light fixtures. Represented by William Cottrell, H. E. Watson, G. B. Weber and A. L. Lubeck.

Berkshire Mfg. Company, Cleveland, Ohio.—Automatic molding machine, air squeezer molding machines, hand squeezer molding machines, core machines, vibrators, flasks, etc. Represented by R. H. York, W. A. Price, W. D. Fraser, F. Hulec and G. L. Cannon.

Charles H. Besly & Co., Chicago, Ill.—Belt and motor-driven disk grinders, double spindle disk grinder, horizontal disk grinder, motor-driven pattern makers' disk grinder, all running under power; also Helmet spiral circles, temper taps, oil and Boxite circles. Represented by Edward P. Welles, Donald P. Welles, Edward K. Welles, W. H. Allen and Charles A. Knill.

S. Birkenstein & Sons, Chicago, Ill.—Pig tin, pig lead, babbitt, solder, brass and bronze ingot, ingot copper, brick copper, antimony, phosphor tin, aluminum, phosphor copper and manganese bronze specialties. Harry Birkenstein, L. Kahn and H. Brown will be in charge.

Blystone Mfg. Company, Cambridge Springs, Pa.—Core sand and facing mixer with and without riddling attachment. Represented by H. J. LeFevre.

Bond Foundry & Machine Company, Manheim, Pa.—In connection with the Reeves Pulley Company will show a full line of power transmission appliances, including a universal four-point hanger, patented compression coupling and steel shaft hanger. Represented by M. T. Williams, W. G. Gross and George C. Norris.

Brown & Sharpe Mfg. Company, Providence, R. I.—Plain grinding machine with multiple friction disk drive, independent of the grinding wheel drive, automatic cross feed which can be set to reduce to a given size and automatically throws out, etc.; heavy plain milling machine, motor-driven, in operation, designed to give immense driving power at slow speeds; universal milling machine with constant speed drive; automatic screw machine with new design with the spindle driven from the machine driving shaft by an open and a cross belt and different spindle speeds available to a pair of change gears, etc.; also a display of cutters and fine tools.

Brown Specialty Machinery Company, Chicago, Ill.—Three types of hammer core machines, equipped to make round cores ⅜ in. to 7 in. in operation, core tapering and cutting off machine, core tapering machine, electric duplex shaker, pneumatic duplex shaker and electric simplex shaker. Represented by Elmer A. Rich, Jr., Herbert T. Rich, John Laycock and Robert Laycock.

Buch Foundry Equipment Company, Bridgeport, Pa.—Hand and electrically operated jar and squeeze molding machines, sample castings made on gravity and jar and squeeze machines, cast-iron floor flasks, tapered aluminum snap flasks, cast-iron bottom plates, cast-iron casings, cast-iron pattern frames, cast-iron pattern plates, treated wood pattern boards, adjustable steel slip flask bars.

Buckeye Products Company, Cincinnati, Ohio.—Parting and core compounds, metal fluxes, high temperature cement, compressed air vibrators and metal melting furnaces. Represented by C. J. Goehringer, J. W. Mann, R. B. Ferguson, W. F. Panek and B. Bernbaum.

Carborundum Company, Niagara Falls, N. Y.—Complete line of carborundum and aloxite wheels for foundry work, carborundum and aloxite paper and cloth, carborundum rubbing bricks and carborundum and aloxite disks. Represented by G. R. Rayner, C. C. Schumaker, O. C. Dobson, J. H. Jackson, R. H. Kerwin and C. D. Bradbury.

Cataract Refining & Mfg. Company, Buffalo, N. Y.—Samples of liquid core compound, Bison parting, full line of cores made from liquid core compound, cutting oils, cutting compounds and soluble oil. Represented by R. J. Collins, D. L. Baldwin, J. Purvis, Jr., W. F. Williams, H. E. Newton, T. J. Kenefick and E. H. Coburn.

Central Iron Works, Quincy, Ill.—Booth for the reception of visitors. Descriptive matter covering complete equipment. Representatives in attendance.

Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic machines, including drills, grinders, rammers, sand sifters, hoists and air compressors. Represented by E. Aplin, C. H. Schumacher, A. E. Conrow, A. C. Andresen, G. W. Parker, J. G. Osgood.

Chicago Pulley & Shafting Company, Chicago, Ill.—Ball bearing hangers and pulleys. Represented by S. A. Ellicson and Oliver Stangland.

The Cincinnati Bickford Tool Company, Cincinnati, Ohio.—One 24-in. high-speed shaft-driven upright drill with tapping attachment, with motor and gear box; one 5-ft. regular plain radial drill with variable speed motor drive. Represented by S. C. Schauer, H. M. Norris, Lee Schauer, John Herking, and others.

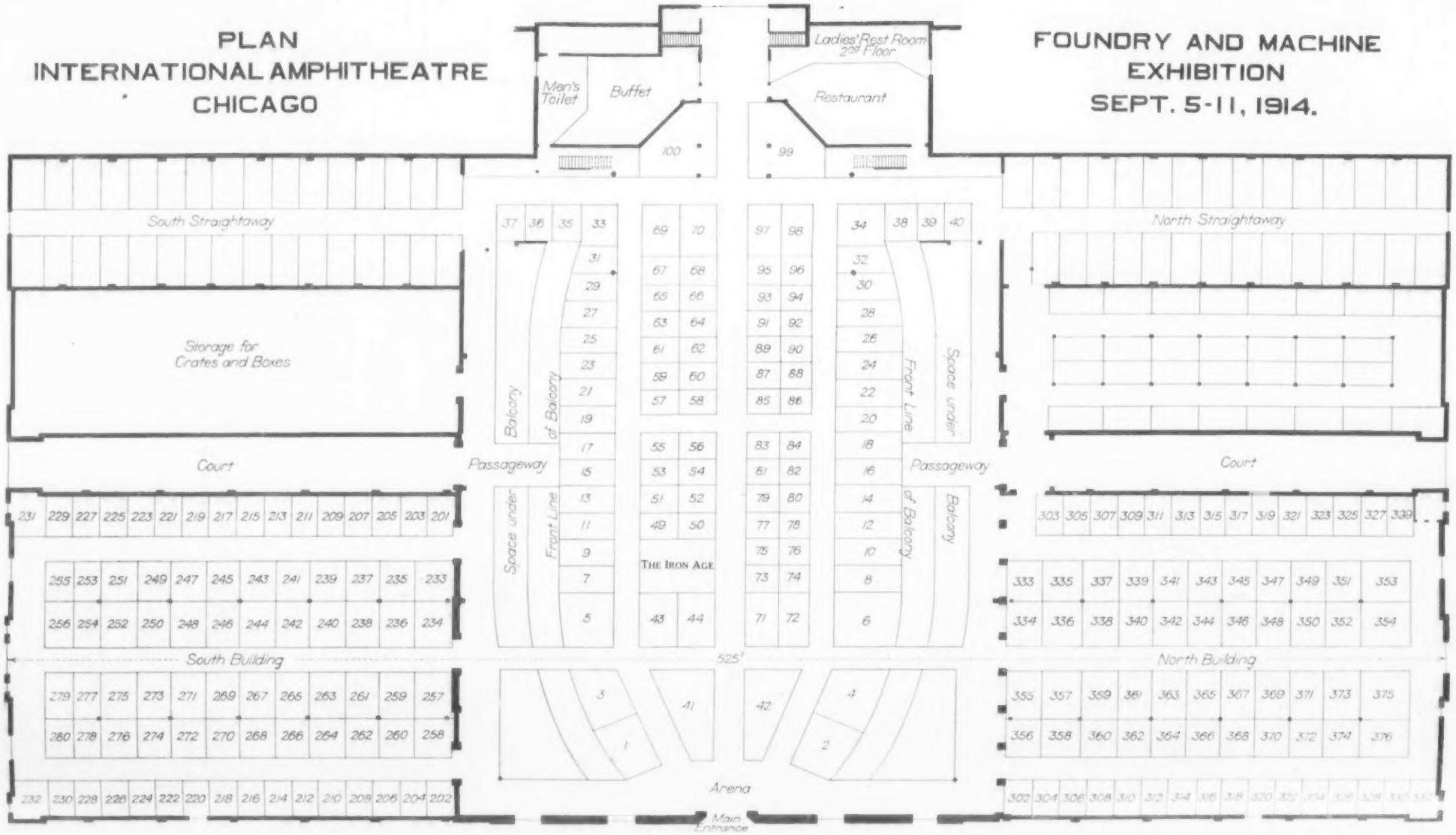
Cincinnati Milling Machine Company, Cincinnati, Ohio.—In connection with the exhibit of the Marshall & Huschart Machinery Company will show in operation a horizontal high power milling machine, motor-driven by belt; a universal cone milling machine with regular equipment, and a grinder sharpening the various styles, sizes and forms of milling cutters for which it is designed. Represented by John G. Klaiber.

Cincinnati Planer Company, Cincinnati, Ohio.—New style 36-in. heavy pattern planer equipped with reversible motor drive of the General Electric make, which eliminates pulleys, belts and overhead mechanism, also rapid power traverse to rail heads. Represented by Charles Meiers, R. S. Jones and B. B. Quillen.

Cincinnati Pulley Machinery Company, Cincinnati, Ohio.—Avey ball bearing drilling machines in various sizes. Represented by J. G. Hey and the Essley Machinery Company.

Charles J. Clark, Chicago, Ill.—Operating exhibit of the Clark blast meter for measuring the volume of cupola blast; meters of various capacities, etc. Represented by Charles J. Clark.

James Clark, Jr., Electric Company, Chicago, Ill.—Willey sensitive drills, portable hand drills and grinders of



Plan of the Exhibition of Foundry Equipment, Machinery and Supplies in Chicago, September 5 to 11

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List Showing Location of Exhibitors at the Foundry and Machine Exhibition, Chicago

various types, all electrically-driven. Represented by W. W. Crooker, James Clark, Jr., and Charles E. Willey.

Cleveland Pneumatic Tool Company, Cleveland, Ohio.—Full line of air tools for foundry service and for general service consisting of riveting and chipping hammers, air drills in all types and sizes, portable emery grinders, sand rammers, etc. Represented by Arthur Scott, C. J. Albert and J. A. Day.

Coburn Trolley Track Mfg. Company, Holyoke, Mass.—Two styles of overhead monorail and moving pictures showing the application of this particular line of product. Represented by W. D. Ballard, F. D. Thorpe and T. H. Udell.

Colburn Machine Tool Company, Franklin, Pa.—A boring mill of 48-in. capacity, with front controlled for stopping and starting from the operator's position, quick adjusting feed clutches on ends of rail for changing from vertical to horizontal feed without delay and helical gear table drive; also a heavy-duty drill press especially designed for very heavy high-speed work.

Cowan Truck Company, Holyoke, Mass.—Various types of trucks for commercial uses, metal platform, photographs and blue-prints of storage battery transveyor, showing installations. Represented by E. J. Smith and F. B. Hopkins.

Curtis Pneumatic Machinery Company, St. Louis, Mo.—Overhead traveling crane, jib crane, overhead trolley system, Curtis foundry hoist, sand blasts and air compressors, all of which will be in operation; also photographs of interesting foundry-elevator and casting-breaker installations. Represented by E. J. Clark and L. C. Blake.

William Demmler & Brothers, Kewanee, Ill.—Core machines of various types. Representatives in attendance.

The Diamond Machine Company, Providence, R. I.—Heavy face grinding machine, motor-driven, equipped with rotary chuck for grinding heavy and general face work; automatic surface grinding machine, motor-driven, equipped with two motors, for accurate precision work and motor-driven tool grinding machine for ordinary lathe and planer tool grinder.

Joseph Dixon Crucible Company, Chicago, Ill.—Full line of graphite crucibles, stoppers, nozzles, dippers, stirrers and miscellaneous heat resisting articles, featuring a non-skimming crucible and a bottom pouring crucible. Represented by D. A. Johnson, W. B. Allen, H. C. Sorenson, F. R. Brandon and Frank Krug.

G. T. Eames Company, Kalamazoo, Mich.—Several types of mandrel presses. Represented by J. H. Penniman.

E. L. Essley Machinery Company, Chicago, Ill.—A number of machine tools in operation, including some manufactured by the following, who will also have their representatives on the ground: American Tool Works Company, represented by J. B. Doan, Robert S. Alter, J. C. Hussey and C. K. Cairns; Cincinnati Pulley Machinery Company, represented by L. B. Patterson and J. C. Hey; Diamond Machine Company, represented by Mr. Wight and Mr. Sleckow; International Machine Tool Company, represented by O. B. Iles, C. L. Libby and F. B. Huston; Barnes Drill Company, represented by B. F. Barnes and J. C. Andress; Colburn Machine Tool Company, represented by L. H. Colburn and H. W. Breckenridge; Skinner Chuck Company, represented by E. J. Skinner; G. T. Eames Company, represented by J. H. Penniman. Representing the Essley Machinery Company will be E. L. Essley, J. R. McDonald, H. F. Roberts, C. M. Robertson, Geo. Burki, J. J. Shanahan, E. P. Essley.

Edgemont Machine Company, Dayton, Ohio.—Complete line of lineshaft clutches, cut-off couplings, gas engine clutches and friction clutch countershafts. Represented by George Stahl, W. P. Coffman and O. B. Coffman.

Federal Foundry Supply Company, Cleveland, Ohio.—Aluminum, adjustable and interchangeable snap flask, core jarring machine with clamping device on table, plain jolt machine, jolt roll-over and direct draw machine and a new jolt and squeeze machine. Represented by W. J. Adams, R. Ditty, E. Kaye, L. H. Heyl, C. A. Collins.

Felt & Tarrant Mfg. Company, Chicago, Ill.—Demonstration of new controlled-key duplex Comptometer adding and calculating machine as applied to book work, billing, estimating, prorating, cost calculations, etc. Represented by W. D. Lawrence and others.

Flexible Steel Lacing Company, Chicago, Ill.—Steel belt lacing, a size fastener for tape belts not over 1/16 in. thick and a standard testing machine. Represented by G. E. Purple.

Garden City Sand Company, Chicago, Ill.—Samples of molding, core and furnace sands, cupola blocks, fire brick, fire clay, sand-blasting sand, waterproofing compounds and Stonekote. Represented by C. S. McNeal and William Chambers.

Gardner Machine Company, Beloit, Wis.—Complete line of disk grinding machinery and accessories, especially ball bearing polishing lathes. Represented by F. E. Gardner, L. W. Thompson, W. B. Leishman, E. B. Gardner, J. M. Gardner, E. L. Beisel, A. A. Swinnerton and W. L. Townsend.

General Electric Company, Schenectady, N. Y.—Arc welding outfit, portable type, mounted on truck with 10½-kw. motor-generator set. Centrifugal compressor, 1,000 cu. ft. free air per min., driven by a 30-hp. induction motor at 3450 rpm., adaptable for cupola blowing.

Gisholt Machine Company, Madison, Wis.—Gisholt automatic vertical boring mill, tool grinder, turret lathe, small tools and the periodograph, which is an electro mechanical time-recording apparatus. Represented by Charles Spalding, E. A. Fuller, G. E. Gernon, J. E. Ruth, E. J. Bullard and E. F. Muther.

Goldschmidt Thermit Company, New York—Various metals free from carbon. Thermit cans for reviving dull iron in the ladle and illustration of the use of Thermit for repairing large rolls and pinions and for preventing piping in steel ingots; an exhibit of specimen welds.

Gould & Eberhardt, Newark, N. J.—With its representatives, the Marshall & Huschart Company, this company will exhibit one of its gear-hobbing machines and a new shaper with motor drive automatic starter and dynamic brake and control. The hobbing machine will be in operation cutting sprocket gears and driven by a Westinghouse motor, direct-connected with automatic push-button control. Represented by F. L. Eberhardt and Mr. Keller.

Great Western Mfg. Company, Leavenworth, Kan.—Two types of Combs' gyratory riddle, one with horizontal electric motors and the other with vertical electric motor. Represented by F. A. Pickett and George W. Combs.

Great Western Smelting & Refining Company, Chicago, Ill.—Ingot brasses of various compositions, polished and unpolished, to show the color of castings which may be made from them, also various castings, babbitt metals and other products. Represented by J. Collin, A. L. Levy, Arthur Lewis, J. B. Neiman and I. N. Perlstein and Samuel Spiro.

The Greaves-Klusman Tool Company, Cincinnati, Ohio.—One 18-in. x 8-ft. geared head single pulley drive engine lathe, with flexible motor drive. Latest design, having start, stop and reverse spindle, as well as speed changes controlled by one lever. Represented by W. A. Greaves.

Hanna Engineering Works, Chicago, Ill.—Various types of electric and pneumatic sand shakers, in the tripod, post and trough styles with syphon lubricator designed for attaching to pneumatic machines of various kinds to give uniform lubrication to all working parts through the live air port. Represented by A. F. Jensen, W. H. Huelster, J. T. Georgeson, David M. Whyte, Philetus W. Gates and James T. Lee.

F. A. Hardy & Co., Chicago, Ill.—Safety glasses and eye protectors for foundry use.

Hayward Company, New York.—Electrically operated clamshell bucket of new design for handling foundry sand and other materials; also orange-peel buckets, drag scraper buckets, etc. Represented by H. S. Atkinson, H. M. Davison, C. S. Sargent and C. F. Hutchings.

Heald Machine Company, Worcester, Mass.—Cylinder grinders, internal grinders, rotary surface grinders and drill grinders. Represented by G. A. Pabst, J. N. Heald, C. N. Cowan and Mr. Massey.

Henion & Hubbell, Chicago, Ill.—Complete line of smooth-on iron cements, concrete paint and corrugated iron gaskets for high pressure flanges. Represented by W. B. Henion, C. W. Hubbell, R. C. Mead, D. P. Toberty, W. J. Walther, W. P. Barclay and Vreeland Tompkins.

Herman Pneumatic Machine Company, Zelienople, Pa.—High duty 50 x 60-in. jar ram molding machine with independent roll over and pattern drawing device, 30 x 45-in. jar ram stripper, 40 x 50-in. and 24 x 24-in. plain bumpers, jar ram molding machine with hand stripper, jar ram molding machine with hand roll over and pattern drawing device and several small and medium-plain jarring machines. Represented by A. M. Frauenheim, Alfred Herman, M. L. Heyl, A. Rodgers, Robert F. Ringle, A. McWithey and Joe Larson.

Hill-Brunner Foundry Supply Company, Cincinnati, Ohio.—Magic metal core box. Represented by John Hill, M. Z. Fox and H. C. Romer.

Hill & Griffith Company, Cincinnati, Ohio.—East India plumbago No. 118, imperial graphite, Ideal core wash, ebony core compound, Faultless parting, imperial parting, ventilated chaplets, and other foundry specialties. Represented by D. T. Richards, Wm. Oberhelman, J. M. Glass, F. McCarthy, J. H. Lyle.

Hunter Saw & Machine Company, Pittsburgh, Pa.—Grinder for grinding teeth of Hunter Duplex inserted tooth saws, saw grinder and beveling machine, several Hunter Duplex tooth saws, saw for cutting hot tubes, saw for cutting ingots and forgings hot, high-speed friction saw (vanadium steel) for cutting rails, etc.

ALFRED E. HOWELL
Pres. Am. Foundrymen's Asso.

G. H. CLAMER
Pres. Am. Inst. Metals

F. N. PERKINS
Pres. Fdry. & Machine Exhib. Co.

A. O. BACKERT
Secy. Am. Foundrymen's Asso.

W. M. CORSE
Secy. Am. Inst. Metals

C. E. HOYT
Secy. Fdry. & Machine Exhib. Co.

R. A. BULL
Vice Pres. Am. Foundrymen Asso.

S. V. BLAIR
Pres. Asso. Fdry. Foremen

R. B. THOMPSON
Secy. Asso. Fdry. Foremen

S. DIESCHER & SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

Independent Pneumatic Tool Company, Chicago, Ill.—Thor single-valve pneumatic chipping, calking and flue-beading hammer, which has a new valve mechanism and is suitable for steel foundry and general foundry service and chipping, calking and flue beading; Thor pneumatic sand rammer, etc. Represented by J. D. Hurley, G. C. Wilson, B. A. Durbin, Fred J. Passino, H. F. Finney and H. H. Henricks.

International Electric Tool Company, Milwaukee, Wis.—Electric vibrator operated by knee plate and complete with switch. Represented by William R. Sorgel and William H. Gaulke.

International Machine Tool Company, Indianapolis, Ind.—Will display as a part of the Essley Machinery Company the 26-in. Libby heavy-duty turret lathe. Represented by C. L. Libby, F. P. Huston, D. J. Cosner and R. H. Radford.

International Molding Machine Company, Chicago, Ill.—Air and electric jarring machines, combination jar ramming, turn over draw machines, etc. Represented by Edward A. Pridmore, W. W. Miller, D. C. Snow, J. W. Dopp, F. W. Hamel, E. M. Hays, Carl Levahn.

Janesville Wisconsin Molding Sand Company, Janesville, Wis.—Four grades of molding sand. Represented by J. F. Pember.

Jennison-Wright Company, Toledo, Ohio.—Kreolite wood block floor construction in its adaptation to various parts of the shop and factory. Also Kreolite cross ties and structural timbers. Represented by F. E. Jennison, F. M. Enright and F. W. Cherrington.

C. W. Johnson, Natick, Mass.—Exhibit of the molders' asbestos shoe, especially designed for safety of the foundrymen, preventing burns, etc. Represented by Fred E. Sauer.

Charles C. Kawin Company, Chicago, Ill.—Chemists and metallurgists. Booth for the reception of visitors. Represented by Charles C. Kawin, J. F. Mellis, R. J. Courtney, William J. Mulcahy and J. H. Hopp.

Knickerbocker Company, Jackson, Mich.—Morse rarified dust collector for use in connection with emery wheels, sand blast, tumbling barrels, etc. Represented by W. B. Knickerbocker.

Julius King Optical Company, Chicago, Ill.—"Saniglas" King's safety eye protectors and helmets for welders and for protection of the eyes of workmen employed in foundries and kindred trades. Represented by J. T. Brayton and J. J. Duffy.

Landis Machine Company, Waynesboro, Pa.—One 1½-in. double-head bolt cutter, motor-driven; one 2-in. single bolt cutter, belt-driven; one 2-in. four-chaser stationary pipe die head; one 4-in. six-chaser stationary pipe die head; one 1¼-in. automatic screw-cutting die head. The 4-in. six-chaser pipe die head is new. Represented by Dorsey Thompson, Jr., and Carl F. Meyer.

La Salle Machine & Tool Company, La Salle, Ill.—In connection with the Marshall & Huschart Machinery Company will be shown a No. 1 plain and surface grinder with micrometer adjustment of this company's make. Represented by F. W. Mattheissen, Jr., and S. M. Trenary.

Lodge & Shipley Machine Tool Company, Cincinnati, Ohio.—One 16-in. x 6-ft. universal new model tool room lathe; also one 18-in. x 8-ft. selective head engine lathe with multiple stops to length and cross feeds, connected compound and plain rests, four-way tool block, pan, pump and tubing, driven by individual motor mounted inside the head leg. Represented by J. C. Carlton.

J. R. Long Company, Akron, Ohio.—Taps, reamers, pipe cutters, etc.

David Lupton's Sons Company, Philadelphia, Pa.—Lupton steel sash, Pond continuous sash, Pond operating device, Lupton rolled steel skylight, all with special attention to the requirements of foundries and forge shops; drawings showing the Pond truss for buildings and photographs of Lupton installations. Represented by Clarke P. Pond and R. A. Sanborn.

J. S. McChesney & Company, Chicago, Ill.—Galvanized electric welded hose bands and tools, electric welded wire products and tools, hand-forged tools, Keller Pneumatic Tool Company pneumatic tools, electric drills and appliances and Kreutzberg volumetric and velocity meters.

J. S. McCormick Company, Pittsburgh, Pa.—Sulky sand riddler with adjustable jacket, Vulcan and Ajax blacking and general foundry supplies. Represented by J. S. McCormick, T. E. Malone and S. R. Costley.

Macleod Company, Cincinnati, Ohio.—One 4000-lb. capacity Buckeye sand blast, sand separator, oil burners for cupola lighting, oil burners for skin drying molds and oxy-acetylene plant for welding and cutting. Represented by Walter Macleod, J. W. Mooney.

Marshall & Huschart Machinery Company, Chicago, Ill.—Will represent and display machines manufactured by the following companies, who will be represented by the persons named: Acme Machine Tool Company, represented by Robert Enderbroch; Cincinnati Milling Machine Company, represented by J. G. Klalber; Cincinnati Bickford Tool Company, represented by August Tuechter and S. C. Schauer; Lodge & Shipley Machine Tool Company, represented by Mr. Jones and Mr. Carlton; Rockford Drilling Machine Company, represented by Lee Daniels; Cincinnati Planer Company, represented by Charles Meiers; Baker Brothers, represented by George Hallenbeck; Gould & Eberhardt, represented by F. L. Eberhardt and Mr. Keller; Greaves-Klusman Tool Company, represented by W. A. Greaves; Landis Machine Company, represented by J. G. Benedixt; Rivett Lathe & Grinder Company, Boston, Mass.; Barnes Drill Company, Rockford, Ill., and Monarch Machine Company, Sidney, Ohio.

Manufacturers' Equipment Company, Chicago, Ill.—Aero chucks and collapsible taps. Represented by Paul J. Grebel and Charles George.

Midland Machine Company, Detroit, Mich.—Grimes jar rammed roll over pattern draw molding machine, hand ram roll over machine and a stripping plate machine. Represented by G. L. Grimes and Charles Skeffington.

Monarch Engineering & Mfg. Company, Baltimore, Md.—Tilting metal melting furnaces, oil, gas and coke fired, single and double chamber, etc.; stationary metal melting furnaces in six similar styles; draw type core ovens, ladle heater, torches, tempering furnace, rivet forge and tank, and tool room furnace. Represented by J. J. Allen, M. W. Woodburn and J. H. Fowler.

Monarch Machine Company, Sidney, Ohio.—In connection with the Marshall & Huschart Machinery Company, one 14-in. x 6-ft. standard single back gear lathe, one 16-in. x 8-ft. 8-speed all geared head motor-driven lathe with Morse silent chain driven in operation.

Mott Sand Blast Mfg. Company, Chicago, Ill.—Represented by David Mayer, E. J. Rosenthal, H. D. Gates, F. J. Hull.

Mumford Molding Machine Company, Chicago, Ill.—Electric cam jolt ramming machines, several sizes of pneumatic jolt rammers, one of which will have in combination a pit pattern drawing mechanism, various sizes of power squeezers and split pattern machines, as well as combination jolt and squeezing machines with new features, vibrators, hand and blow valves, etc. Represented by E. H. Mumford, David M. Whyte, W. H. Huelster, A. F. Jensen, J. T. Georgeson, Philetus W. Gates and James T. Lee.

National Engineering Company, Chicago, Ill.—Simpson intensive foundry mixers in operation.

The National Machinery Company, Tiffin, Ohio.—Single bolt cutter to cut ½-in. bolts and 1-in. die sharpener.

Newport Sand Bank Company, Newport, Ky.—A full line of molding sand suitable for all classes of work.

Norma Company of America, New York.—Norma anti-friction ball and roller bearings; the Hirth minimeter, for the comparison of fine measurements. Represented by W. M. Nones, O. P. Wilson, G. R. Blott and John Bell.

Norton Company, Worcester, Mass.—Grinding demonstrations on new model 2-in. Norton floor stand, new model ¾-in. Norton bench stand, also exhibit of Alundum and Crystolon grinding wheels. Represented by Carl F. Dietz, John Horne and William Jove.

S. Obermayer Company, Chicago, Ill.—Simpson intensive foundry mixer, ideal power dump core sand mixer, core jarring machine, core venting machine, electric sand sifter, rosin grinder, Todd rumbler, sprue cutter, core ovens, ladles, supplies, etc. Represented by T. Kauffmann, E. D. Frohman, S. T. Johnston, C. M. Barker, J. E. Evans, O. J. Peterson, W. M. Fitzpatrick, F. H. Dodge, O. C. Olson, A. M. Wallin, G. P. Peterson and C. H. Green.

Osborn Mfg. Company, Cleveland, Ohio.—Plain jolt machines, direct draw roll over jolts, drop plate and stripping plate machines, air squeezer and drop plate flask stripping squeezer machines, direct draw roll over machines, roll over rock down machines and rock over drop draft machines. Represented by H. R. Atwater, E. S. Carman, M. W. Zeman, E. T. Doddridge, Paul E. Ryan and F. D. Jacobs.

Oxweld Acetylene Company, Chicago, Ill.—Welding of iron, steel and aluminum castings and the cutting of steel billets and risers with the Oxweld cutting blow pipe. Represented by W. S. Hoyt, R. R. Browning, and others.

Pangborn Corporation, Hagerstown, Md.—Enlarged photographs of sand-blast equipment, sand separators, sand dryers, ventilating equipment, sand elevators, sand and dust conveyors, dust collecting equipment, moisture and oil separators and complete sand blast installations. Represented by Thomas W. Pangborn, John C. Pangborn and William A. Rosenberger.

E. O. Partridge, 2047 W. Lake Street, Chicago.—Nine emery grinders with adjustable steel guards. Represented by E. C. and A. L. Partridge.

J. W. Paxson Company, Philadelphia, Pa.—Sand blast machinery, sand shifting machinery, magnetic separator,

Chairmen of the Convention Committees

E. P. WELLES

J. A. GALLIGAN

H. O. LANGE

D. EVANS

A. G. McKINLEY

C. B. CARTER

Mr. Lange, Ferguson & Lange Foundry Company, is general chairman.

Mr. Galligan, Pickands, Brown & Co., is chairman of reception committee for American Foundrymen's Association.

Mr. Welles, Charles H. Besly & Co., is chairman of the reception committee for American Institute of Metals.

Mr. Evans, Chicago Steel Foundry Company, is general secretary.

Mr. McKinley, Griffin Wheel Company, is chairman of the entertainment committee.

Mr. Carter, American Brake Shoe & Foundry Company, is chairman of the banquet committee.

Mr. Sonne, Rogers, Brown & Co., is chairman of the printing committee.

A. O. SONNE

molding sand, foundry facings, foundry supplies, photograph display fixtures, showing installations, etc. Represented by H. M. Bougher, E. M. Taggart and I. F. Kremer.

Peerless Parting Company, Ottawa, Ill.—Samples of parting compound, white silica sand, ground silica and tripoli, in all grades; also various other minerals. Represented by C. A. Hupp.

Pickands, Brown & Co., Chicago, Ill.—Reproduction of the Panama Canal in Solvay coke, showing the canal flooded. Pocket maps illustrating trade routes through the canal compared with the route through the Straits of Magellan. Represented by Frank T. Lovering, Thos. W. Glasscot, B. T. Bacon, E. A. Bateman, A. B. Hawes, F. L. Schulze, R. J. Mahoney, G. A. T. Long and J. A. Gailigan.

Prest-O-Lite Company, Inc., Indianapolis, Ind.—Two complete Prest-O-Welder outfits for oxy-acetylene welding and cutting, employing Prest-O-Lite acetylene service showing two styles of welding cylinders, containing approximately 100 cu. ft. and 300 cu. ft. of purified acetylene; also samples of welding of iron, steel, aluminum, brass and bronze done with the outfit. An expert welder will demonstrate different operations. Represented by W. H. Adkinson.

Henry E. Pridmore, Chicago, Ill.—Stripping plate, rock-over drop, power squeezer, plain electric-driven jarring, combination electric jolt rock-over drop, electric jolt stripping plate, power ramming stripping plate, hand squeeze stripping plate, combination electric jolt and power rock-over drop and power rock-over drop machines. Represented by Mrs. E. M. Pridmore, H. A. Pridmore, D. F. Eagan, C. H. Ellis, A. V. Magnuson, T. J. Magnuson.

Reeves Pulley Company, Chicago, Ill—Variable speed transmission, wood split pulley, Rhineland commercial and line shaft ball and roller bearings, and numerous other power transmission appliances. Represented by M. O. Reeves, G. L. Reeves, D. E. Lewellen, C. L. Irwin, W. A. Richards and A. E. Shibley.

Richmond Stay-Bolt Machine Mfg. Company, Inc., Richmond, Va.—Semi-automatic staybolt drilling machine, 12-spindle, motor-driven, in operation.

Rivett Lathe & Grinder Company, Boston, Mass.—Two bench lathes and a grinder for grinding ball bearings. Represented by the Marshall & Huschart Machinery Company, Chicago.

Robeson Process Company, Pennington, N. J.—Glutrin. Represented by D. S. Robeson, W. E. Baird and T. J. Ryan.

Rockford Drilling Machine Company, Rockford, Ill.—Four-spindle 14-in. manufacturers' gang drill, 23-in. star lever heavy duty type upright drilling machine and 14-in. upright tapping machine. Represented by Lee G. Daniels.

Rock Island Mfg. Company, Rock Island, Ill.—Vises for machine shop and foundry use. Represented by E. W. Scott, O. J. Shields and C. E. Shields.

Rogers, Brown & Co., Cincinnati, Ohio.—Pig iron, coke, ferromanganese, Rosiclare fluorspar and castings, made of the company's product, which includes 65 different iron brands. The company's Chicago representatives will be in attendance as well as representatives from their other offices.

SKF Ball Bearing Company, New York.—Ball bearing hangers, pillow blocks, and post hangers, mounted to show how shafting can be deflected without putting any binding strains on the bearings; also an assortment of ball bearings, and some very large hangers and pillow blocks of the most approved modern type. Represented by J. B. Castino, H. Dunning and A. V. Farr.

Sand Mixer Machine Company, 220 Broadway, New York City.—Two improved sand-cutting machines, both self-propelled. Represented by V. E. Minich, William A. Heartt, Hutton H. Haley, John Bradley and Charles L. Benham.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.—Cage controlled electric traveling hoist, monorail type; five-ton capacity electric traveling crane trolley; high lift type direct-current hoist of one-ton capacity; alternating-current single I-beam hoist of one-ton capacity; back-geared motor with winch head attached and specimens of gearing. Represented by F. A. Hatch, R. H. McGredy, W. B. Briggs and N. Prakken.

Skinner Chuck Company, New Britain, Conn.—Complete line of lathe, drill and planer chucks, drill press vises and face plate jaws; also center arbors for drill chucks. Represented by E. J. Skinner.

W. W. Sly Mfg. Company, Cleveland, Ohio.—Sand blast mill equipment, photographs of installation and descriptive literature. Represented by W. C. Sly, George J. Fanner, P. W. Graue and T. J. Morgan.

R. P. Smith & Sons Company, Chicago, Ill.—Safety congress shoes for molders and foundrymen. Represented by J. B. Smith, Jr.

Sterling Wheelbarrow Company, West Allis, Wis.—Rolled steel flasks, wheelbarrows, trucks and other foundry equipment. Represented by I. R. Smith, H. H. Baker, E. W. Sample, J. M. Dickson and J. J. Coyne.

Frederic B. Stevens, Detroit, Mich.—Booth for the reception of visitors. Represented by James F. Hughes, Jr., Alfred T. Wagner, W. H. J. Clupp, Joseph M. Johnston and John Mayers.

Sullivan Machinery Company, Chicago, Ill.—Angle compound belt-driven two-stage air compressor operating at 80 lb. pressure, motor-driven; 8 x 8 x 10-in. straight line single-stage steam-driven compressor and 8 x 8-in. belt-driven inclosed type single-stage compressor with unloading device. Represented by Howard T. Walsh, William P. J. Dinsmoor, Edward T. Almy, J. C. West, F. R. Alger, F. H. Hoge, H. M. Boice and S. B. King.

Tabor Mfg. Company, Philadelphia, Pa.—Plain power squeezers, jarring squeezers, roll-over molding machines and jarring machines. Represented by Wilfred Lewis, H. W. Brown, J. H. Coleman, Glen B. Hastings, Dudley Willcox, D. J. Martin and H. W. Impey.

Titanium Alloy Mfg. Company, Niagara Falls, N. Y.—Various grades and sizes of ferro carbon-titanium, also specimens of castings of steel and iron. Specimens of brass, bronze and copper castings. Represented by N. Petinot, W. M. Corse, H. R. Corse, H. H. Cook and R. T. Harris.

United States Electrical Tool Company, Cincinnati, Ohio.—Various electrically driven drills and grinders of both portable and stationary types, equipped with new Westinghouse motor for use on direct current and alternating current 110 volts, 60 cycles or less, single phase. Represented by the Schneider Sales Company, 9 South Clinton street, Chicago.

United States Graphite Company, Saginaw, Mich.—A display of various foundry facings. Represented by J. C. Drought, F. B. Godard and W. C. Webb.

H. S. Vrooman, Chicago, Ill.—Victor sand screen equipped with ¼-hp. motor. Represented by H. S. Vrooman and H. S. Vrooman, Jr.

Vulcan Engineering Sales Company, Chicago, Ill.—Products of the Q M S Company and Hanna Engineering Works, etc. These will include a Q M S cold metal cut off sawing machine, air hoists and trolleys; Hanna Engineering Works pneumatic and electric sand shakers of the tripod, post and trough types, equipped with new syphon lubricator to be used with pneumatic machines. Represented by J. T. Georgeson, W. H. Huelster, David M. Whyte, A. F. Jensen, Philetus W. Gates and James T. Lee.

John B. Wallace, Chicago, Ill.—Bench planer 4-in. wide capacity, portable type, for general wood working. Represented by J. D. Wallace and Clifford Landis.

Warner & Swasey Company, Cleveland, Ohio.—Universal turret screw machine of new design, equipped with power longitudinal feed for carriage and arranged for chasing threads with the carriage. The feeds for the carriage and turret are independent, making it possible to use whichever feed is best adapted for either member; Universal hollow hexagon turret lathe, adapted for either bar work or chucking work, but shown with the chucking outfit, and 18-in. Universal brass turret lathe. Represented by A. C. Cook, L. K. Goss, H. E. Witham, C. E. Neubert.

Wernicke-Hatcher Pump Company, Grand Rapids, Mich.—New type of rotary air compressor, air cooled, giving positive displacement and compressing air to 100 lb. gauge pressure in a single stage. Represented by William A. Hatcher, H. M. Abernathy, W. R. Harvey, J. F. Wernicke and L. C. Rahm.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.—Arc-welding demonstration and industrial motors.

Whiting Foundry Equipment Company, Harvey, Ill.—Five-ton two-motor electric crane trolley on structural frame (operating exhibit); 30 x 48-in. Class "A" spur geared tumbling barrel; section of standard drawer type core oven (ironwork only); 72-in. diameter flat top turntable; photographs and blue prints showing latest layouts of foundry plants, etc. Represented by C. A. Hardy, R. H. Bourne, P. A. Dratz, R. E. Prussing, and others.

Wilmarth & Morman Company, Grand Rapids, Mich.—Motor-driven wet surface grinding machine in operation; direct-connected motor-driven New Yankee drill grinders; combination cutter, reamer and drill grinder, etc. Represented by S. O. Livingston, E. T. Gorham and H. L. Saunders.

T. B. Wood's Sons Company, Chambersburg, Pa.—New adjustable jacket for snap molds. Represented by C. O. Wood, W. H. Fisher, George M. Naylor and Victor Lesher.

E. J. Woodison Company, Detroit, Mich.—Galvarim riddles with loose bottoms; also Woodison steel vibrator. Represented by E. J. Woodison, Pierce G. Smith, R. H. Mills and M. A. Bell.

Wyoming Shovel Works, Wyoming, Pa.—Shovels and scoops for foundry trade; also an unbreakable handle. Represented by G. E. Geer.

Canadian Steel and Pig-Iron Output

Special statistical bulletin No. 9, issued by the Bureau of Statistics of the American Iron and Steel Institute, William G. Gray, statistician, gives the official figures of the Canadian production of steel ingots and finished forms of rolled iron and steel in 1913 and pig iron in the first half of 1914. Extracts are as follows:

Half Yearly Output of Pig Iron

The production of pig iron in Canada in the first six months of 1914, including ferrosilicon and ferrophosphorus, amounted to 442,430 gross tons, against 469,137 tons in the last half of 1913, a decrease of 26,707 tons, or nearly 5.7 per cent. In the first half of 1913 the output was 545,981 tons. Comparing the output in the first half of 1914 with the output in the first half of 1913 shows a decrease in the first half of 1914 of 103,551 tons, or over 18.9 per cent. Of the total in the first six months of 1914, 433,733 tons were made with coke and 8,697 tons with charcoal, electricity, etc.

The production of pig iron in Canada by grades in the first half of 1914, as compared with the two halves of 1913, is shown in the following table; also the increase or decrease by grades.

	Production—Gross tons		
Grades	First half 1913	Second half 1913	First half 1914
Basic	292,625	265,899	197,806
Bessemer	125,052	102,610	126,040
Foundry, ferrosilicon, etc.	128,293	96,938	108,058
Malt, white and mot., ferro-alloys, etc.	11	3,690	10,526
Total	545,981	469,137	442,430

Of the 442,430 tons of pig iron produced in the Dominion in the first six months of 1914, 281,030 tons were delivered to mixers, open-hearth furnaces, foundries, etc., in a molten condition, 123,397 tons were sand cast, 37,994 tons were machine cast, and 9 tons were direct furnace castings.

On June 30, 1914, Canada had 22 completed blast furnaces, of which 11 were in blast and 11 were idle. Of the total 17 furnaces usually use coke for fuel and 5 use charcoal. In the first half of 1914 two plants made 50 per cent. ferrosilicon or ferrophosphorus in electric furnaces.

Steel Ingots and Castings

The production of all kinds of steel ingots and direct steel castings in Canada in 1913 amounted to 1,042,503 gross tons, against 853,031 tons in 1912, an increase of 189,472 tons, or over 22.2 per cent. Of the total in 1913 about 1,006,149 tons were ingots and about 36,354 tons were direct steel castings, against about 820,792 tons of ingots and about 32,239 tons of castings in 1912. The production of steel ingots and castings in 1913 was much the largest in the history of the Dominion. The growth in late years has been very rapid. Since 1908 the output has increased over 100 per cent.

In 1913 there were 16 works in 4 provinces which made steel ingots or castings, as compared with 14 works in 4 provinces in 1912.

The production of Bessemer steel ingots and castings in 1913 amounted to 273,391 tons, against 207,569 tons in 1912, an increase of 65,822 tons, or over 31.7 per cent., while the production of open-hearth steel ingots and castings in 1913 amounted to 768,663 tons, against 645,062 tons in 1912, an increase of 123,601 tons, or over 19.1 per cent.

Of the total production of open-hearth steel in 1913, 736,562 gross tons were ingots and 32,101 tons were castings, against 617,061 tons of ingots and 28,001 tons of castings in 1912. In both years all the open-hearth ingots were made by the basic process, but the castings were made by both the acid and the basic processes. One plant made steel by the duplex process in 1912 and 1913.

Finished Rolled Iron and Steel

The production of all kinds of finished rolled iron and steel in Canada in 1913 amounted to 967,097 gross tons, as compared with 861,224 tons in 1912, an increase of 105,873 tons, or nearly 12.3 per cent. The output in 1913 was the largest in the history of the Dominion. The year of next largest production was 1912.

Of the total production in 1913 about 95,881 tons were iron and about 871,216 tons were steel, against about 109,012 tons of iron and about 752,212 tons of steel in 1912.

The following table gives the production of all kinds of finished rolled products in the last five years. The output of one plant is estimated.

Products—Gross tons	1909	1910	1911	1912	1913
Rails	344,830	366,465	360,547	423,885	506,709
Structural shapes and wire rods	74,136	80,993	76,617	64,082	68,048
Plates and sheets, nail plate, merchant bars, tie-plate bars, etc.	243,775	292,353	344,760	373,257	392,340
Total	662,741	739,811	781,924	861,224	967,097

Of the 33 active rolling mills and steel works in 1913, 5 were in Nova Scotia, 9 in Quebec, 15 in Ontario, 2 in Alberta, and 1 each in New Brunswick and British Columbia.

Cut and Wire Nails

We estimate the total production of iron and steel cut and wire nails in Canada in 1913 as amounting to 1,520,000 kegs of 100 lb., as compared with an estimated production in 1912 of 1,490,000 kegs, an increase of 30,000 kegs, or over 2 per cent. It was necessary to estimate the output of a few plants for the two years.

Finished Angle Splice Bars, Etc.

The production of finished angle splice bars, tie plates, fish plates, and other rail joints and fastenings in Canada by rolling mills and steel works in 1913, all steel, not including spikes, bolts, nuts, and similar fastenings, amounted to 54,839 gross tons, as compared with 52,157 tons in 1912.

Higher Prices for Manganese Ores

Under recent date the Carnegie Steel Company of Pittsburgh sent out a schedule of prices which it will pay per ton of 2240 lb. for domestic manganese ore as follows:

Delivered at—Lucy Furnaces, Carnegie Steel Company, Pittsburgh, Pa., Isabella Furnaces, Carnegie Steel Company, Etna, Pa., or South Works, Illinois Steel Company, South Chicago, Ill.

For ore containing above

49% metallic manganese, 26c. per unit
46 to 49% metallic manganese, 25c. per unit
43 to 46% metallic manganese, 24c. per unit
40 to 43% metallic manganese, 23c. per unit

Prices are based on ores containing not more than 8 per cent. silica, and not more than 0.20 per cent. phosphorus, and are subject to deductions as follows:

For each 1 per cent. in excess of 8 per cent. silica, there shall be a deduction of 15c. per ton, fractions in proportion.

For each 0.02 per cent., or fraction thereof, in excess of 0.20 per cent. phosphorus, there shall be a deduction of 2c. per unit of manganese per ton.

Ore containing less than 40 per cent. manganese, or more than 12 per cent. silica or 0.225 per cent. phosphorus, subject to acceptance or refusal, buyer's option.

Settlements are based on analysis of sample dried at 212 deg. Fahrenheit.

The percentage of moisture in the sample as taken to be deducted from the weight.

Prices subject to change without notice, unless otherwise specially agreed upon.

Corrigan, McKinney & Co. will erect a by-product coke plant in connection with their new steel plant in Cleveland, Ohio. Definite plans have not yet been completed, but it is the intention to provide a plant with a daily capacity of about 2000 tons of coke, this output being sufficient to supply the firm's two present blast furnaces and its two additional furnaces that are to be built.

The iron mine of the Ahles Mining Company, near Buttzville, Warren County, N. J., has been closed for an indefinite period.

ESTABLISHED 1855

THE IRON AGE

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EDITORS

GEO. W. COPE A. I. FINDLEY W. W. MACON

CHARLES S. BAUR, *Advertising Manager*

New Outlet for Government Energy

The European war, with its wholly unexpected effect on numerous domestic industries, brings up the desirability of the national Government extending its activity along lines of great importance to the country. When the performances of the Government for the last 10 or 12 years are analyzed, how little is seen to have been done for the material advancement of the country or for the improvement of the masses of the people. We have had a great deal of labor legislation, all of it aimed at securing greater ease for working people and reduced returns for investments of capital. We have had tariff legislation, admittedly intended to make importations easier and to diminish the business of our domestic manufacturers. We have had great energy infused into the punitive branch of the Government for the purpose of breaking up combinations of manufacturers and producers and making it more difficult for business operations to be conducted on a large scale. As to actual constructive legislation or Government achievements for the benefit of the country, we have little to show outside of the currency bill providing for the establishment of reserve banks. All the agencies, in fact, of both national and State legislative bodies have been operating, and very busily operating, to hamper railroads and manufacturers and largely for the purpose of making political capital to secure partisan advantage.

Almost alone in his advocacy of something of constructive benefit to the country was Senator-elect Underwood of Alabama, who recognized so forcibly the crying demand for building up our merchant marine that he secured the insertion in the tariff act of a measure designed to encourage commerce under the United States flag. Even this is now the subject of judicial interpretation, and it remains to be seen whether the provision can be made effective without the abrogation of a number of commercial treaties. We can now see, with the developments that have so suddenly been sprung upon the country as the result of the European war, how much might have been done in the past dozen years if this country had only been ruled by broad-minded statesmen animated by a desire to promote the material welfare of the country and incidentally the happiness and well-being of its citizens. If the energies of the Government which have been so strongly applied to the chastisement of business interests had been directed to the cultivation of industries which were then shown by our large imports to be in need of active development we would now be in a practically independent position. Those who are intrusted with the direction of national matters would do well to look into this situation. They should see if it is not possible to have some of the surplus energy of the Government devoted to investigating how the industries of this country can be more thoroughly developed so as to make us as independent as possible of outside sources of supply.

Fair Rates for Railroad Service

Indications are appearing of the possible renewal of the attempt by Eastern railroads to secure permission to make an advance in freight rates. The great change in business conditions following the breaking out of the European war presents an entirely new set of influences which it is felt may bring a more favorable response from the Interstate Commerce Commission than its decision recently handed down. So heavy has been the decrease in railroad traffic because of the interference with exports that the railroad companies are in a much more serious situation than they were when they made their appeal for increased rates. This state of affairs is also being strongly felt by industries dependent upon the railroad demand. Orders for equipment and for other railroad material are almost negligible, and unless something is done to help the railroad companies to secure more revenue they are likely to purchase less and less as the fall months roll by. It is stated that the leading trunk lines have ordered their office forces to economize strictly in the most trivial of office supplies, even extending to lead pencils. This is not done for the purpose of impressing outsiders with an appearance of poverty, but through dire necessity. The president of an important railroad system is stated to have alleged in the past week that if his company had not been so fortunate a few months ago as to be able to make financial arrangements to cover its requirements for the next two or three years it would by this time have been in the hands of a receiver, its revenues having fallen so heavily since these arrangements were completed.

The Pennsylvania Railroad Company has taken a step toward putting in force the recommendation of the Interstate Commerce Commission that passenger rates should be revised for the purpose of endeavoring to offset the inadequacy of revenues from freight traffic. It has filed notice that be-

ginning October 1 the charge for open and interchangeable mileage tickets shall be at the rate of 2¼ cents per mile instead of 2 cents as heretofore, and it further states that other readjustments will be made in passenger rates to be announced later and which will so spread the changes in fares that the burden will fall but lightly on any single traveler. Other railroad companies are rapidly following the example of this great system. But will the Interstate Commerce Commission set aside such applications for decision three or six months hence?

An indication that railroads may now be treated more fairly by Congress is the report just submitted of the Joint Congressional Committee on railroad mail by recommending the enactment of a bill which would increase the pay of the railroads for carrying mail about $3,000,000 a year over the appropriation for the present fiscal year. An apparently well-informed writer in an article appearing in the Boston News Bureau states that there is scarcely a doubt that, responding to public opinion, the Interstate Commerce Commission has abandoned its old attitude of hostility to the railroads and will give them a squarer deal in the future. It is to be hoped that this is true.

Iron-Ore Output and Consumption

Production of iron ore in the United States in 1913 is announced by the United States Geological Survey to have been 61,980,437 gross tons. The amount "marketed," or rather shipped from mines, irrespective of whether it reached a point of consumption or remained on dock, is given at 59,643,098 tons, the difference of 2,337,339 tons representing an increase of stocks at mines. In 1912 the difference was 4,640,252 tons in the other direction, while in 1911 the excess mined was 2,784,105 tons, so that in three years the excess of ore mined over that marketed was relatively small, only 481,192 tons.

The quantity of ore "marketed" is not, of course, the quantity consumed, there being fluctuations in the stocks on docks and at blast furnaces, as well as in imports and exports. The Bureau of Statistics of the Iron and Steel Institute makes a statement of the amount of iron ore and briquettes consumed by blast furnaces, not including mill cinder and scale, etc., and it may be of interest to set all the statistics together: 1. Ore mined. 2. Ore "marketed" or shipped. 3. Shipments less exports plus imports, representing roughly the receipts at blast furnaces, neglecting the fluctuations in dock stocks. 4. Consumption as reported by the blast furnaces to the Institute. This is done in the table below:

	Production	Shipments	Receipts	Consumption
1911	43,876,552	41,092,447	42,135,793	43,980,000
1912	52,377,362	57,017,614	57,926,448	55,656,000
1913	61,980,437	59,643,098	61,195,773	58,274,000

According to the above figures, which while not absolutely accurate are sufficiently close for purposes of comparison, there were large iron ore stocks in the country at the beginning of this year. The stocks at mines on January 1, 1913, were reported by the Survey at 10,241,287 tons. The difference between the ore mined and marketed in 1913 was 2,337,339 tons, representing last year's increase in stocks at mines. The stocks on Lake Erie docks December 1, 1913, were 9,261,676 tons, and there were stocks also at Lake Michigan receiving docks (really furnace yard stocks). Finally, the apparent supplies to furnaces exceeded the reported consumption by 2,270,000 tons in 1912 and by 2,922,000 tons in 1913, an excess for the two years of 5,200,000 tons; and there were undoubtedly fair-sized stocks at the furnaces at the beginning of this two-year period, or on January 1, 1912.

The figures above given show that the stocks of iron ore in the United States at the beginning of this year were roundly 27,000,000 tons plus the furnace stocks of January 1, 1912. There have been times when the stocks in the yards of furnaces using Lake Superior ores were from 12,000,000 to 15,000,000 tons at the opening of the year. If it be assumed that they were as much as 13,000,000 tons at the opening of 1912 the figures we have given would point to total stocks of ore in the United States at the opening of 1914 amounting roundly to 40,000,000 tons. In the light of these figures and of the steady falling off in pig-iron production since navigation opened the smallness of the Lake movement of ore this year is readily understood.

Much has been said about the curtailment of Lake Superior iron-ore operations in the past half year. It is known, however, that stockpiles at Lake Superior underground mines are now very large, the amount being estimated to be greater than at this time in any previous year. A large percentage of the underground mines were shut down last spring or in early summer, but the owners kept their men at work in the first few months of this year, when pig-iron output was increasing, hoping that conditions would so improve as to bring a fair demand for ore. Some of the mines that shut down in the spring with large stockpiles have not sold a ton of ore. Others have been fortunate enough to reduce their stockpiles considerably, but generally there is an unusual desire to realize on accumulated stock. On the whole, the situation represents one of the greatest congestions in the history of the trade.

Manufacturers' Co-operation on Exports

The various national manufacturers' associations can do their members a great service just now in giving them the best information available concerning the uppermost problem, the enlargement of the export trade. Excellent work has already been done by the National Association of Manufacturers in the issuance of bulletins covering transportation questions and giving data concerning the situation in South America, Europe and the Orient. The suggestion has been made that manufacturers' conventions might be held, each dealing with a separate trade, for threshing out the new questions that have arisen in the past month. In a number of cases the manufacturers in the larger cities have taken up the question through their chamber of commerce, board of trade or manufacturers' club.

The National Machine Tool Builders' Association had decided long before there was a real threat of war to devote to export trade discussions a large

part of the time at its annual meeting to be held in New York in October. Already the list of speakers insures much real enlightment on questions now asked on all sides. The association's officers will not wait for October, however, in starting their campaign of education. Letters are to be sent to the membership with a view to drawing out opinions and experiences. Other trade organizations are showing equal alertness. Manufacturers who find their immediate operations cut down to any extent by the temporary embargo on exports in familiar channels have a most unusual incentive and opportunity to get in line for business in new directions.

At a time like this sober heed is likely to be given at Washington to proposals like that which came from the National Foreign Trade Convention at Washington three months ago for legislation permitting combinations of manufacturers for carrying on export trade. Some of the leading independent steel companies of the country had up, about two years ago, the proposal to form an export company so that jointly they could do business with outside markets in the way that the Steel Corporation had handled the export trade for years. Fear that the Sherman law would be invoked against such a joint company—albeit it was plainly in furtherance and not in restraint of trade—prevented action on the plan. With the coming on of war in Europe there have been some pretty rapid strides at Washington in that same dollar diplomacy that before had been under the ban. Manufacturers have only commendation for the new attitude, with no disposition to complain that it was not taken earlier. Now let the programme be enlarged to take in a bill allowing American manufacturers to join forces, under Government oversight, in carrying on export operations which would be well nigh impossible to individual companies. In the steel trade it has been demonstrated beyond question that only with enormous resources and with widely diversified products can headway be made in this trade against the splendid export machinery Germany and Great Britain have been years in building and perfecting.

Pacific Coast Ferromanganese

The Noble Electric Steel Company, whose office is at 995 Market street, San Francisco, Cal., has been preparing to manufacture ferromanganese at its electric furnace plant at Heroult-on-the-Pitt, Shasta County, California. By this time it is probable that one furnace is operating on the ferroalloy, with the expectation of a second furnace making the same product shortly. The company will use manganese from deposits in the vicinity of its plant, several of which are of considerable extent and have a good grade of ore. The furnaces at Heroult are stated to be admirably adapted for the purpose. The high price which ferromanganese is now commanding has decided the company to embark in its manufacture.

The Hendey Machine Company, Torrington, Conn., manufacturer of lathes, milling machines and shapers, announces the following changes in its selling agency arrangements: For New England territory the trade will hereafter be handled direct from the factory; for New York City territory an office has been established in the Singer Building, in charge of H. P. Eilers; in western Pennsylvania it will be represented by the Laughlin-Barney Machinery Company, Pittsburgh.

CORRESPONDENCE

Waste in Circular Advertising

To the Editor: The volume of advertising in *The Iron Age* is significant not only of the value of the medium, but also of the fact that there are numerous competitors after the business of its readers. Success in obtaining this business depends much upon the work of clinching the sale. Observation has convinced the writer that this part of the campaign could be conducted with more economy than now seems prevalent.

Advertising, like manufacturing, has its overhead, and while this includes circularizing "prospects" which never become customers it also covers the expense of preparing and distributing this printed matter. Judging from the over generous manner in which circulars are showered upon us through the mail this phase of the advertising campaign is not subjected to the same close scrutiny by the advertising manager as the set-up for use in the selling sections of the periodicals. There is one house from which we receive letters almost daily which puts copies of the same inserts in each envelope. This sometimes continues for as long as two weeks. It might also be remarked in passing that each letter is in a separate envelope, this increasing the expenditure for postage.

In circularizing prospects repetition may be a prime necessity but a customer of long standing should need certainly not more than two or three reminders of a new line. Surely it would mean a saving if these folders were sent out independently of the regular mail, but under letter postage. By a system of careful checking to insure the right number of repeats the desired results would be obtained. The saving in printing, etc., would at least pay for the extra work and postage.

Advertising has been likened to the fire under the boiler and we all know that beyond a certain point in coal consumption you get no more power. This lack of method seems to obtain in the handling of all printed matter which is sent out, for I have noticed the same needless duplicating of notices of removal, change of partnership, etc. H. D. M.

Capitalizing Failures in Advertising

To the Editor: I read not long ago about a disaster in which a few men were killed. Photographs of the failure were shown and the product of a prominent company showed plainly. The product was mentioned in the description, although it was not directly blamed. In fact, the product was not the cause, but the writer of the article did not say so.

For several weeks after this failure I watched the advertisements of the manufacturer concerned, expecting him to come out with the facts, and with pointers that would be of value to future users of his product. But he jumped clean over the incident. He ignored it. He showed nothing but pictures of successes.

Facts, actual occurrences, good and bad, would make advertising matter much more interesting and profitable than it is at present. The manufacturers who first take up the absolute truth policy will never regret it. W. F. SCHAPHORST.

Training Employees

To the Editor: In Bulletin No. 5 of the National Association of Corporation Schools appeared an article on training employees, prepared by J. H. Weller. Through a mistake on the part of the printer my name was substituted and in your reprint in *The Iron Age* of July 30 I am given the credit for this article.

Mr. Weller is our able supervisor of labor and I do not for one moment want to steal his thunder. If you can properly arrange it, would appreciate your giving him the credit for the description of our methods. ARTHUR E. CORBIN,
Assistant Sales Manager Packard Motor Car Company,
Detroit, Mich.

STEAM PUMP RECEIVERSHIP

International Steam Pump Company Succumbs to Financial Stress

The International Steam Pump Company, with main office at 115 Broadway, New York, voluntarily went into receivership August 26. Shortage of money, due to the war, was given as the immediate cause, although for some time rumors have been current that reorganization was impending. In an equity suit brought to conserve the assets of the company, Judge Julius Mayer, in the United States District Court, appointed C. Philip Coleman and Grayson M. P. Murphy receivers.

The company was incorporated in New Jersey in 1899, and acquired control of not less than two-thirds of the capital stock of the following corporations: Blake & Knowles Steam Pump Works, East Cambridge, Mass.; Deane Steam Pump Works, Holyoke, Mass.; Henry R. Worthington, Harrison, N. J.; Laidlaw-Dunn-Gordon Company, Cincinnati; Snow Steam Pump Works and Holly Mfg. Company, Buffalo, N. Y.; Clayton Air Compressor Works, New York. In 1906 it acquired the entire outstanding stock of the Power & Mining Machine Company, Cudahy, Wis., and in 1910 the plant of the Jeanesville Iron Works Company, Hazleton, Pa., as well as the entire capital stock of the Fred M. Prescott Steam Pump Works, West Allis, Wis. The company's majority interest in the stock of the Denver Rock Drill & Machinery Company, now the Denver Rock Drill Mfg. Company, was disposed of in 1912-13.

The company has an authorized capital of $15,000,000 6 per cent. accumulated preferred and $24,000,000 common stock, of which $11,350,000 preferred and $17,762,500 common have been issued. The board of directors has given out the following statement:

> The receivership is a friendly one, the company itself having filed an answer admitting the allegations of the petition and joining in the application. The receivership was rendered necessary by the fact that, although the company has been doing a fairly prosperous business, and has been earning considerably more than its interest charges, it will not be able to make the interest payment of about $235,000 and the sinking fund payment of $250,000 due September 1 on its first lien 20-year 5 per cent. bonds. It also lacks adequate working capital.
>
> Apart from these bonds, of which $9,347,900 are outstanding, the company has no other indebtedness, except its current monthly accounts, aggregating about $115,000, for supplies and merchandise, its payrolls, and $1,150,000 of collateral trust notes, maturing October 2 next, which are amply secured by collateral.
>
> The receivership of the International Steam Pump Company is not expected to involve any of its associated or subsidiary companies. Its principal associated companies are the Henry R. Worthington Company, the Blake & Knowles Steam Pump Works, and the Power & Mining Machinery Company, which have no indebtedness except to the parent company for advances, current monthly accounts, which they pay promptly, and amply secured notes given as part of the collateral for the International Steam Pump Company's collateral notes. It is expected that those companies will continue their operations without change.
>
> The receivers expect to carry on the business of the International Steam Pump Company and continue to receive and execute orders without interruption, pending the reorganization, which it is expected will be promptly accomplished.

The company and its subsidiaries have made annual sales of about $11,000,000. Dividends of 6 per cent. per annum were paid quarterly on the preferred stock from August 1, 1899, to February 1, 1913, inclusive, but none since. Dividends on the common stock at 4 per cent. were paid from July 1, 1901, to July 1, 1904. On October 1, 1904, ½ per cent. was paid on the common stock and a similar dividend was declared in January and April, 1905, but none since.

Benjamin Guggenheim was chairman of the board of directors and president of the company from 1907 until his death on the Titanic in 1912. The present officers are: William Guggenheim, chairman of the board of directors, and Leon P. Feustmann and C. Philip Coleman, vice-presidents. The directors are N. M. Clark, C. Philip Coleman, Leon P. Feustmann, Thomas B. Gannett, S. R. Guggenheim, William Guggenheim, J. B. Haggin, George G. Henry, William C. Lane, Edgar M. Leventritt, H. Esk Moller, A. N. Parlin and T. M. Schumacher.

With a view to a prompt reorganization of the company it is announced that a bondholders' committee has been selected as follows: Charles H. Sabin, vice-president Guaranty Trust Company of New York, chairman; Thomas B. Gannett, Parkinson & Burr, Boston; George G. Henry, William Salomon & Co., New York; R. Walter Leigh, Maitland, Coppell & Co., New York; H. J. de Lanoy Meijer, Boissevain Brothers, Amsterdam, and Allen T. West, G. H. Walker & Co., St. Louis. The secretary of the committee is Otis Everett, 140 Broadway, New York. A committee has also been organized to act for the preferred and common stock in connection with the reorganization.

The A. Buch's Sons Company, Elizabethtown, Pa., states that the molding-machine end of its business has been removed to Bridgeport, Montgomery County, Pa., and is now being conducted under the name of Buch Foundry Equipment Company. The old company at Elizabethtown continues to manufacture land roller lawn swings, corn shellers, etc.

W. A. Stone & Co., Uniontov N. Y., miners and shippers of coa of Connellsville coke, have disconti phia office, which was in the Land Ti

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The Iron and Metal Markets

EXPORTS AT GOOD PRICES

Considerable Business Already Placed

The Steel Corporation Has Sold Some Ferromanganese—Sheet and Tin Plate Business Heavy

The extent to which foreign orders have come or will come in to make up for the falling off in new business at home is the uppermost question in the steel trade. The United States Steel Corporation, with its complete machinery for handling exports, has naturally closed the bulk of the outside business done thus far. No figures are given as to volume, but it is stated that the sales include plates, skelp, structural steel, wire rods, sheets and tin plate, fence wire and wire nails. In one case, a plate inquiry for an Australian water line, Germany got the original order, which was 12,000 tons. This has now been transferred to the United States at an advance of $7 a ton over the price in the German contract.

One satisfactory feature is the good prices realized on these foreign orders, now that German competition is removed. A sale of 1000 tons of wire nails was made to England at $1.80, Pittsburgh, plus extras, and one of 1000 tons of wire rods at $27, Pittsburgh.

An English tube works has bought a considerable lot of skelp here and excited efforts are being made by English tube and sheet mills to get spelter from the United States.

Independent steel companies in common with the Steel Corporation are receiving inquiries for prices on export material, but in a number of cases New York trading firms which desire to handle some of the iron and steel business expected to come to this side are collecting prices and other details. There is thus considerable duplication and some of the inquiries are tentative. Recently inquiries for a total of 50,000 tons of sheet bars came to a number of domestic companies, but no buying is reported as yet.

The Steel Corporation's export trade will be freed this week of some of the handicap of the past month, as ten of its vessels will come at once under American registry following the proclamation of the President which is expected to-day.

Reports from a number of steel companies are that the volume of new contracts has been declining and mention is made of some cancellations that have been due to inability to finance, as in the case of a few projects involving structural steel. Railroad heads have been more stringent in their orders to cut down expenditures and steel works are hearing less from this source than in many weeks.

The Steel Corporation, however, with its diversity of products and its foreign business, states that its new orders as well as shipments in August were more than in July and, contrary to the expectation that unfilled orders as of August 31 would be less than on July 31, a slight increase may be shown by the statement of September 10.

The ferromanganese market is quieting down. Contrary to what was understood to be its policy when the war broke out, the Steel Corporation has made a few sales of the metal, the price being around $85. Two steel companies have bought lots of English ferromanganese for forward delivery at a somewhat higher level. Several cargoes from England are now on the water. A number of buyers having English contracts have agreed to pay $15 a ton more than the original contract price of $37 or $38, in order to insure delivery. It is understood that the Steel Corporation has on hand a considerable amount of Brazilian ore and that it is importing from no other source. Two cargoes of ore from the Caucasus, intended for Germany, were diverted to this country and were bought by an eastern Pennsylvania steel company at about 25 cents per unit of manganese.

Our London cable says the British Government is considering the prohibition of ferromanganese shipments because the high prices recently offered in the United States may lead to the diversion of the metal from English users.

A most unusual inquiry has come to this country from the far East, calling for several thousand tons of spiegeleisen.

Pittsburgh reports that the rate of operation at some steel works and rolling mills is slightly less. The Steel Corporation, which late in July was operating at 70 per cent. of ingot capacity, now reports 65 per cent. active. In blast furnaces the percentage is 67.

In finished materials sheets have shown the greatest activity in the past two weeks and prices have advanced. The tin plate business has also increased and prices have risen in view of the uncertainty as to the tin market, in spite of a decline from 39c. to 38c. in pig tin this week. The heavy present demand for canned goods and this year's unusual output of can manufacturers are also factors. The American Sheet & Tin Plate Company's orders and specifications for sheets in August were larger than for any other month since February, 1913. Due to the advance in spelter, galvanized sheets are stiffening and 3c. for No. 28 is now the market for forward deliveries.

In the Chicago district the pig iron market is slightly more active, with a number of sales of 500 to 2000 tons. Northern makers have taken most of the business, going below the equivalent of $10, Birmingham, named by Southern competitors. In the East sales of pipe iron have developed prices 50 cents and more below the recent market.

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A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

All quotations one week, one month, and one year previous.

	Sept. 2, 1914.	Aug. 26, 1914.	Aug. 5, 1914.	Sept. 3, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	$14.75	$14.75	$14.75	$15.75
No. 2 Valley furnace	13.00	13.00	13.00	14.00
No. 2 Southern, Cin'ti	13.25	13.25	13.25	14.25
No. 2 Birmingham, Ala.	10.00	10.00	10.00	11.00
No. 2 furnace, Chicago*	13.50	13.50	13.75	15.00
Basic, del'd, eastern Pa.	14.00	14.00	14.00	15.00
Basic, Valley furnace	13.00	13.00	13.00	14.00
Bessemer, Pittsburgh	14.90	14.90	14.90	16.65
Malleable Bess., Ch'go*	14.50	14.00	14.00	15.00
Gray forge, Pittsburgh	13.65	13.65	13.65	14.25
L. S. charcoal, Chicago	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	21.00	21.00	19.50	25.00
Open hearth billets, Pittsburgh	21.00	21.00	19.50	24.50
Open hearth sheet bars, P'gh	22.00	22.00	20.50	25.00
Forging billets, base, P'gh	26.00	26.00	25.00	30.00
Open-h. billets, Phila	23.40	23.40	21.90	26.00
Wire rods, Pittsburgh	**26.50**	26.00	24.50	28.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	12.00	12.00	12.00	14.00
Iron rails, Philadelphia	14.00	14.00	14.00	17.50
Car wheels, Chicago	11.25	11.25	11.25	12.75
Car wheels, Philadelphia	11.50	11.50	11.00	12.50
Heavy steel scrap, P'gh	11.25	11.25	11.50	12.25
Heavy steel scrap, Phila.	10.50	10.50	9.75	11.50
Heavy steel scrap, Ch'go.	9.50	9.50	9.75	10.25
No. 1 cast, Pittsburgh	11.50	11.50	11.50	12.75
No. 1 cast, Philadelphia	12.00	12.00	12.00	12.75
No. 1 cast, Ch'go (net ton)	9.50	9.50	9.50	10.75
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.45	1.17½	1.17½	1.37½
Iron bars, Pittsburgh	1.20	1.20	1.15	1.60
Iron bars, Chicago	1.07½	1.07½	1.07½	1.40
Steel bars, Pittsburgh	1.20	1.20	1.15	1.40
Steel bars, New York	1.36	1.36	1.31	1.56
Tank plates, Pittsburgh	1.20	1.20	1.10	1.40
Tank plates, New York	1.36	1.36	1.26	1.56
Beams, etc., Pittsburgh	1.20	1.20	1.15	1.45
Beams, etc., New York	1.36	1.36	1.26	1.61
Skelp, grooved steel, P'gh	1.20	1.20	1.15	1.35
Skelp, sheared steel, P'gh	1.25	1.25	1.20	1.45
Steel hoops, Pittsburgh	1.30	1.30	1.20	1.50
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	**1.95**	1.90	1.80	2.15
Galv. sheets, No. 28, P'gh	**2.95**	2.90	2.75	3.20
Wire nails, Pittsburgh	1.60	1.60	1.55	1.65
Cut nails, Pittsburgh	1.60	1.60	1.55	1.60
Fence wire, base, P'gh	1.40	1.40	1.35	1.45
Barb wire, galv., P'gh	2.00	2.00	1.95	2.05
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$1.70	$1.70	$1.70	$2.50
Furnace coke, future	1.75	1.75	1.85	2.50
Foundry coke, prompt	2.20	2.25	2.25	2.90
Foundry coke, future	2.35	2.35	2.35	3.00
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	13.00	13.00	12.87½	16.25
Electrolytic copper, N. Y.	12.37½	12.37½	12.50	16.12½
Spelter, St. Louis	5.90	5.90	4.85	5.75
Spelter, New York	6.05	6.05	5.00	5.90
Lead, St. Louis	3.72½	3.72½	3.72½	4.67½
Lead, New York	3.87½	3.87½	3.90	4.75
Tin, New York	38.00	39.00	57.00	43.35
Antimony, Hallett's, N. Y.	14.00	16.00	8.00	7.75
Tin plate, 100-lb. box, P'gh	$3.60	$3.50	$3.25	$3.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.; New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal on plates, shapes, etc., is 46c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.20c., base, net cash, 30 days.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over and zees, 3 in. and over, 1.20c. to 1.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.80. Galvanized bar wire and fence staples to jobbers, $2; painted, $1.60. Wire nails to jobbers, $1.60. Woven wire fencing, 73 per cent. off list for carloads; 72 off for 1000-rod lots; 71 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wire Rods.—Bessemer, open-hearth and chain rods, $26.50.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from April 20, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3	80	71½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53		2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	78	69½	1 to 1½, butt	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	57½	⅜	63	52
½	73	63½	½	67	60
¾ to 1½	77	70½	¾ to 1½	71	62
2 to 3	78	71½	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	74	65½	1½	65	59
2½ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12	63	52½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6	59	53
7 to 8	58	47½	7 to 8	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3½ in.	70	2½ to 2¾ in.	54
3½ to 4½ in.	72	3 and 3½ in.	57
5 and 6 in.	65	3½ to 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f. o. b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.40 to 1.45
Nos. 9 to 10	1.45 to 1.50
Nos. 11 and 12	1.50 to 1.55
Nos. 13 and 14	1.60 to 1.65
Nos. 15 and 16	1.70 to 1.75

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.60 to 1.65
No. 12	1.60 to 1.65
Nos. 13 and 14	1.65 to 1.70
Nos. 15 and 16	1.70 to 1.75
Nos. 17 to 21	1.75 to 1.80
Nos. 22 and 24	1.80 to 1.85
Nos. 25 and 26	1.85 to 1.90
No. 27	1.90 to 1.95
No. 28	1.95 to 2.00
No. 29	2.00 to 2.05
No. 30	2.10 to 2.15

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.95 to 2.00
No. 12	2.05 to 2.10
Nos. 13 and 14	2.05 to 2.10
Nos. 15 and 16	2.20 to 2.25
Nos. 17 to 21	2.35 to 2.40
Nos. 22 and 24	2.50 to 2.55
Nos. 25 and 26	2.65 to 2.70
No. 27	2.80 to 2.85
No. 28	2.95 to 3.00
No. 29	3.10 to 3.15
No. 30	3.25 to 3.30

Pittsburgh

PITTSBURGH, PA., September 1, 1914.

The tonnage involved in reported foreign inquiries for steel products is probably much exaggerated in some printed reports. This comes from the fact that foreign inquiries often go to New York importing houses, who then send them to the different steel works and the amount involved in each one thus is often multiplied four or five times. The Carnegie Steel Company reports that so far very little actual inquiry has come up to it for foreign shipment, but the American Steel & Wire Company is receiving a good many foreign inquiries for rods and fence wire, mostly from England, and the American Sheet & Tin Plate Company is getting some foreign inquiry for sheets and tin plate from England, Australia, South America and Norway and Sweden. So far but little business for foreign shipment has been closed with Pittsburgh mills. It is a fact that about two weeks ago an inquiry came to this country from England for about 50,000 tons of sheet bars, but nothing definite has been done with it. A local interest has sold 1000 tons of open-hearth rods for shipment to England on the basis of about $27, Pittsburgh. It will take considerable time until the necessary arrangements can be made for getting bottoms, and also fixing credits with foreign consumers, and not before that can much business go abroad from this country. Local conditions in the steel trade are very quiet, orders taken by the mills in August showing a falling off as compared with July. Sheets and tin plate alone show an increase. Prices are fairly strong, but there are no indications of a higher market in the near future. The rate of mill operations is showing a slight falling off.

Pig Iron.—The Pennsylvania Railroad has bought about 3100 tons of coke and charcoal pig iron for delivery to its Altoona and Pittsburgh shops, the coke iron going to furnaces in central Pennsylvania and the charcoal iron to Detroit furnaces. It develops that the total purchases of the Standard Sanitary Mfg. Company were about 4000 tons of Southern iron for last quarter delivery to its Louisville works at about $10, Birmingham, and about 8000 tons of northern No. 2 for the same delivery to its North Side and New Brighton plants. A large consumer in northern Ohio is reported in the market for 4000 tons of foundry iron for last quarter. Prices are fairly steady, but not enough new business is coming out to test the market. The Shenango Furnace Company has blown out No. 3 stack at Sharpsville, Pa., for relining and Cherry Valley furnace of M. A. Hanna & Co., at Leetonia, Ohio, will probably be blown in this week. We quote: Bessemer, $14; basic, $13; malleable Bessemer, $13; No. 2 foundry, $13 to $13.50; gray forge, $12.75, all at Valley furnace, with a freight rate of 90c. a ton for Cleveland or Pittsburgh delivery. W. P. Snyder & Co. report the average price of Bessemer pig iron in August to have been $14 and basic pig iron $13, both at Valley furnace. These are the same average prices that have ruled for the past five months.

Ferroalloys.—The local market in ferromanganese is very quiet, with little new inquiry. Consumers seem to be pretty well covered over the remainder of this year, but some inquiries are out for delivery in first quarter of 1915. The asking price on 80 per cent. English ferromanganese for last quarter delivery ranges from $80 to $100, and on carload lots from stock for spot shipment as high as $140 is being quoted. We therefore quote the market at $80 to $100 for forward delivery and $100 to $125 in carload lots for spot shipment. Prices on ferrosilicon are unchanged, but very firm. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Billets and Sheet Bars.—Consumers seem to be pretty well covered over the remainder of this year and new inquiry for billets and sheet bars is light. Several makers do not seem anxious to sell far ahead, as they fully believe prices will be higher in the near future. Specifications against contracts from the sheet and tinplate mills are showing a notable increase. We quote Bessemer and open-hearth billets at $21, and Bessemer and open-hearth sheet bars at $22, Pittsburgh or Youngstown, freight added to point of delivery. We quote forging billets at $26 for desirable orders of one size and up to but not including 10 x 10 in., the regular extras being charged for larger sizes. We quote axle billets at $24 on desirable orders and $25 for small lots, f.o.b. Pittsburgh. These prices are only good for prompt acceptance and for shipment within two or three months.

Steel Rails.—In standard sections only small orders are being placed, and it is not expected that any large contracts will come out from the railroads until late this year or early next year. Reports of large foreign inquiries for standard and light rails cannot be confirmed here, and have not reached the local producer. The new demand for light rails is active, the Carnegie Company having received new orders and specifications in the past week for over 30,000 tons. This company will also roll 14,000 tons of 80-lb. rails for export to South America, the contract having recently been taken by the United States Steel Products Company. It is understood that rerolling rail mills have advanced their prices on light rails about $1 a ton. We quote light rails, rolled from billets, as follows: 25, 30, 35, 40 and 45-lb. sections at 1.15c., 16 and 20-lb., 1.20c.; 12 and 14-lb., 1.25c., and 8 and 10-lb., 1.30c., in carload lots, f.o.b. Pittsburgh. Rerolled light rails are being quoted at $1 a ton less than the above prices.

Muck Bar.—It is understood that 300 to 500 tons of domestic muck bar was sold in this market last week at about $28, delivered to consumer's mill. We quote the market at that price.

Cotton Ties.—The season is about over. The Carnegie Steel Company is still quoting 72½c. per bundle on the few small stray inquiries that are being received.

Structural Material.—The market is quiet. A number of large jobs, that would have probably gone through had the European war not started, have been held up on account of this and also because of the tight money market. The Penn Bridge Company, Beaver

Falls, Pa., has taken a bridge at Charlotte, N. Y., about 1000 tons. The Carnegie Steel Company will furnish 300 tons of plain material for a new bridge for the Parkersburg & Ohio River Bridge Company. The Baltimore & Ohio Railroad is in the market for about 8000 tons for a new bridge over the Allegheny River, bids for which are to be closed on September 14. The Pennsylvania Railroad is in the market for a number of small bridges, aggregating probably 1000 tons. While prices are firm, there is no indication of a higher market in the near future. We quote beams and channels up to 15-in., at 1.20c., f.o.b. Pittsburgh.

Plates.—The market is dull. Some of the smaller plate mills are short of work, and are inclined to slightly shade 1.20c. for prompt business. No car orders are out, but the inquiry of the Southern Pacific for 4600 miscellaneous cars is still active, and it is believed, if prices are satisfactory, the road will buy the cars. There has been a dearth of inquiry for new cars since the European war started and steel car companies are short of work. The Woods Run works of the Pressed Steel Car Company is idle and the McKees Rocks plant, which can turn out about 110 cars a day when running full, is operating to only about 30 per cent. The Jones & Laughlin Steel Company has taken 250 tons of sheet piling for a new railroad bridge at Kiskiminetas Junction, Pa. Specifications against contracts for plates at 1.10c. and some at 1.15c. are fairly active, but few new orders have been placed at the 1.20c. price. Some inquiries for plates from England, Norway, Sweden and Australia are reported, but as far as can be learned nothing has been actually closed. We quote ¼-in. and heavier plates at 1.20c., f.o.b. Pittsburgh.

Steel Wheels.—No large orders have been placed for some time, owing to the lack of new business in steel cars. We quote wrought steel wheels as follows: Engine truck, 33-in., $22.50; 36-in., $23.50; tender, 33-in., $18.50; passenger train car and tender, 36-in., $20.50; freight car, 33-in., $15.50. All with standard 2½-in. rims and minimum standard hubs, usual extras applying for thicker rims and larger hubs; all f.o.b. cars, Pittsburgh.

Skelp.—A good many foreign inquiries for skelp have been received by local mills, but nothing has been absolutely closed. One inquiry for 5000 tons of grooved steel skelp from England may possibly go through if proper credit arrangements can be made. Domestic demand for skelp is dull as all the pipe mills have had a large falling off in new business. We quote: Grooved steel skelp, 1.20c.; sheared steel skelp, 1.25c.; grooved iron skelp, 1.55c.; sheared iron skelp, 1.65c., delivered to consumers' mills in the Pittsburgh district.

Iron and Steel Bars.—There is only a fair demand for iron and steel bars, most consumers being covered by contracts placed in July and at lower prices than are ruling now. Specifications against these contracts are coming in at a fair rate and shipments of steel bars by the mills in August were larger than in July. However, specifications from implement makers, car and wagon builders are lighter now than usual at this time of the year. Prices on iron and steel bars are firm, but only a relatively small amount of new business at the 1.20c. price for steel bars has been closed. We quote steel bars at 1.20c., maker's mill, for delivery over the next 60 days, while for remainder of the year shipment, some mills are quoting 1.25c. We quote common iron bars, made from scrap and muck bar, at 1.20c., f.o.b. maker's mill, Pittsburgh. Regular extras for twisting reinforcing steel bars over the base price are as follows: ¾-in. and over, $1; ½ to 11/16-in., $1.50; under ½-in., $2.50 per net ton. These extras are not always observed.

Wire Rods.—There is but little domestic demand. Active inquiries for rods from England, Canada, Norway and Sweden have been received by local mills. One interest has sold 1000 tons of rods for shipment to England on the basis of about $27, f.o.b. Pittsburgh. The higher prices being obtained on rods for foreign shipment have firmed up domestic prices, which are about 50c. a ton higher. We now quote Bessemer, open-hearth and chain rods at $26.50, f.o.b. maker's mill, Pittsburgh.

Sheets.—The American Sheet & Tin Plate Company reports that its new orders and specifications for sheets in August were the largest in any one month since February, 1913. New orders are fairly active, but most consumers covered late in June and early in July for delivery over present quarter, and specifications against these contracts are heavy. Owing to the excitement in the spelter market, prices on galvanized sheets are higher. The general market is now 1.40c. to 1.45c. for blue annealed sheets, 1.95c. to 2c. on No. 28 Bessemer black and 2.95c. to 3c. on No. 28 galvanized, the lower prices being for spot shipment and the higher prices for delivery over last quarter. Only a few mills will sell No. 28 black sheets at 1.95c. and No. 28 galvanized at 2.95c., and specifications must accompany the order. We quote No. 28 black plate, tin mill sizes, H. R. and A. at 1.95c. to 2c.; Nos. 29 and 30, 2c. to 2.05c. The above prices are for carload and larger lots, f.o.b. Pittsburgh, jobbers charging the usual advances for small lots from store.

Tin Plate.—A fair amount of new business is being placed and at prices somewhat higher than were ruling before the European war broke out. However, the excitement over pig tin has largely quieted down, and it is now believed there will be a sufficient supply to take care of the consumptive demand. There are no regular prices on tin plate, each inquiry being considered by itself and prices quoted accordingly. One leading tin plate interest has sold upward of 40,000 boxes of bright plate at $3.75 per base box, and another 15,000 to 20,000 boxes at $3.60 to $3.65 per base box. Tin-plate makers are urging consumers to specify on their contracts as promptly as possible, as unless they do so deliveries cannot be guaranteed. This resulted in the Standard Oil Company and several of the large can makers sending in very large specifications in August. Some foreign inquiry is in the market for tin plate, one of 2000 to 3000 boxes coming from India. We quote 100-lb. 14 x 20 coke and terne plates at $3.60 to $3.75, f.o.b. maker's mill, the lower price for spot shipment and the higher price on contracts for delivery over remainder of the year.

Shafting.—While prices are firmer, the market has not responded fully to the higher prices ruling for semi-finished products. The new demand for shafting is quiet, and specifications from large consumers, such as the implement makers and automobile builders, are only fair. Some of the shafting makers are still taking in steel bars on the basis of 1.10c., and are inclined to quote relatively low prices rather than allow business to go to other makers who have their own supply of bars. We quote cold-rolled shafting at 66 per cent. off in carload lots delivered in base territory and 63 to 65 per cent. off in small lots.

Hoops and Bands.—New orders being received are light and only for small lots, as consumers are pretty well covered over the remainder of the year. We quote steel bands at 1.20c., and steel hoops at 1.30c., f.o.b. Pittsburgh, for delivery over remainder of this year.

Spikes.—New orders are light and specifications from railroads that covered some time ago are only fair. One local spike mill was closed down last week on account of lack of orders. We quote standard sizes of railroad and boat spikes at $1.40 to $1.50, and small railroad and boat spikes at $1.50 to $1.60 per 100 lb. in carload lots, f.o.b. Pittsburgh.

Merchant Steel.—Mills report a fairly active demand for small lots, but specifications against contracts in the latter part of August were not as good as earlier in the month. The outlook for a good fall business in implement steels is regarded as fairly good, but the present demand is lighter than expected. Prices are firm and on small lots mills quote as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20

carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Wire Products.—Some inquiries for barb and fence wire have been received by local makers from England and several other foreign countries. One local wire mill has made several fairly large shipments of fence wire to England. The new demand for wire and wire nails is quiet, but specifications are fairly good. Some disappointment is being expressed by makers of wire products over the fact that trade is not as active at this season as usual. However, an active fall business is looked for in fence wire, but as yet specifications against contracts have not started to come in very freely. On new orders we quote wire nails at $1.60; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2; painted barb wire, $1.60; all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. We quote steel cut nails at $1.60 to $1.65, f.o.b. Pittsburgh, in carload lots. We quote woven wire fencing at 73 per cent. off in carload lots, 72 off on 1000-rod lots, and 71 per cent. on smaller lots, all f.o.b. Pittsburgh.

Nuts, Bolts and Rivets.—The new demand is only fair and for small lots. This is for the reason that most consumers covered in June and early July for remainder of this year. Specifications against contracts are only fair. It is said that discounts are being better observed than for some time. We quote buttonhead structural rivets in carload lots at 1.55c. and in small lots, 1.65c.; cone-head boiler rivets, 1.65c. in carload lots, and 1.70c. in small lots; terms, 30 days net, 2 per cent. off for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blank and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.P.C. and r sq. nuts, blank and tapped	$6.00 off list
Hexagon nuts, ⅝ in. and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. or under	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, tin plated, packages	80, 10 and 5% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set-screws	75, 10 and 10% off

Standard Pipe.—Mills report that actual orders entered in August showed a falling off as compared with July. There was a marked decrease in the amount of business taken in oil well supplies and pipe for gas and oil lines, but the new demand for merchant pipe is fairly active and made up some of the losses on the other lines. Reports are that the project to build another pipe line from the Oklahoma fields to Port Arthur, Texas, has been revived and that the line is to be laid by Dutch interests. This line would take about 600 miles of 8-in. pipe, but no actual inquiries have reached local mills. Discounts on iron and steel pipe are reported as being firmly held.

Boiler Tubes.—The new demand is only fair, merchant tubes being more active than locomotive tubes. Prices are more or less shaded, depending on the order.

Coke.—The market is practically bare of new inquiries for furnace and foundry coke, and prices are only fairly strong. Best grades of standard furnace coke for spot shipment can be had at $1.70 to $1.75, and 72-hr. foundry coke at $2.15 to $2.25 per net ton at oven. Consumers not covered by contracts for the remainder of the year are buying from month to month. The output of coke in the upper and lower Connellsville regions for the week ended August 22, as reported by the Connellsville Courier, was 259,665 net tons, an increase over the previous week of 2325 tons.

Old Material.—The local market is dull. A large consumer of borings and turning is out of the market, having accumulated large stocks. Most consumers of scrap have heavy stocks and as they are running only to 60 to 75 per cent. of capacity, their consumption is much less than usual. One consumer, however, took in a fairly large tonnage of selected heavy steel scrap in the past week at $11.50, delivered. Prices are only fairly strong. For delivery to consumers' mills in the Pittsburgh and nearby districts, that take the same rates of freight, prices are about as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.50 to $11.75
Ordinary steel melting scrap	11.25 to 11.50
Compressed side and end sheet scrap	10.00 to 10.25
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.25 to 8.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.25 to 14.50
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.75 to 8.00
Old carwheels	11.25 to 11.50
Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	12.00 to 12.25
Old iron rails	13.75 to 14.00
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	11.25 to 11.50

†Shipping point.

This week practically all the plants of the Republic Iron & Steel Company at Youngstown, Ohio, are in full operation. The 20-in. bar mill, that had been idle for about five months, was put in operation on Tuesday, September 1, with considerable orders ahead.

Chicago

CHICAGO, ILL., September 2, 1914.—(*By Wire.*)

For the present the volume of business is declining. This is shown in the scarcity of new inquiry, by cancellations in a variety of manufactures and by a sharp shrinkage in bank clearings. While the banks are talking prosperity, they are urging conservatism on borrowers and holding a tight rein on money. There appears to be no decline in the interest rate. With these facts business is actually contending, and it is not difficult to find conservative sentiment. It is fortunate that the aspects of the immediate situation are relieved by a very substantial and growing belief that events will move toward much greater activity as commerce adjusts itself to meet through new channels the world demand for necessities. Inquiry for pig iron has shown rather sharp improvement, although still somewhat spasmodic, but the increased demand has brought out some weaknesses in the market. With the exception of the sheet mills, steel mill operations are hardly as heavy as they were a fortnight ago. While specifications on old contracts make a satisfactory aggregate, new business is noticeably curtailed. Contracts for fabricated steel made a better showing in tonnage last week, but the business closed includes only what has been under negotiation for some time. The railroads have again placed an embargo on all purchases not absolutely required and report the holding up of much new work because of the financial situation.

Pig Iron.—Inquiry for pig iron during the past 10 days has been decidedly brighter. It is confined almost entirely to shipments over the remainder of the year. A number of sales in lots of 500 to 2000 tons are noted, and in securing this business Northern furnaces have been much more eager than the Southern interests. For iron to be delivered in Chicago and vicinity, quotations of $10, Birmingham, for Southern No. 2 foundry have failed to secure business in competition with Northern analysis iron from lake furnaces. The demand for foundry iron has been accompanied by wider activity in charcoal iron. The demand for malleable Bessemer has been more limited, but $13.50 delivered in Chicago has been quoted. This is equivalent to $13.25 at the furnace. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, mal-

leable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	14.00 to 14.50
Northern coke foundry, No. 2	13.50 to 14.00
Northern coke foundry, No. 3	13.25 to 13.75
Southern coke, No. 1 f'dry and 1 soft	14.85 to 15.10
Southern coke, No. 2 f'dry and 2 soft	14.35 to 14.60
Malleable Bessemer	13.50 to 14.00
Standard Bessemer	17.00
Basic	13.25 to 13.50
Low phosphorus	21.00 to 21.75
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 percent.	18.90 to 19.40

(By Mail)

Rails and Track Supplies.—One of the largest of the Western railroads reports this week that it has a great quantity of work which should be done on its lines but that it cannot possibly afford to pay what is being asked for money and has in consequence suspended all work until the situation improves. This is, in a measure, representative of the attitude of most of the other roads, although during the past week orders for about 4000 tons of rails were released, together with a considerable quantity of spikes and track bolts. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c. to 2c., base, all in carload lots, Chicago; tie plates, $25.50 to $26, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Structural lettings reported last week, including about 1000 tons for the Belmont avenue bridge at Chicago, which was closed about two weeks ago, totaled close to 7500 tons. The largest item in this tonnage was the 3710 tons for the Manheimer Building at St. Paul mentioned last week. The contract was placed with the Herzog Iron Works, the material being for the most part Bethlehem shapes. The Willys-Overland Company's building, Chicago, requiring 876 tons, went to the Hansell-Elcock Foundry Company; the Montrose avenue bridge, Chicago, 238 tons, to the Modern Steel Structural Company; the Illinois State Bank Building, Quincy, Ill., 229 tons, to the Vanterhort Construction Company; an International & Great Northern Railway bridge at Houston, Tex., 116 tons, to the Wisconsin Bridge & Iron Company; a sanitarium at Jorden, Minn., 144 tons, to the Minneapolis Steel & Machinery Company; the Colorado National Bank Building, Denver, 717 tons, to the Omaha Structural Steel Company; 218 tons for the Colorado Fuel & Iron Company, to M. J. Patterson; 151 tons for a Northern Pacific Railway draw span and 163 tons for a court house at Pekin, Ill. Aside from the specifications on old contracts and lower prices, the business placed with the mills the past week was exceedingly light, it being one of the dullest weeks in several months. Prices show no indication of weakness and we quote for Chicago delivery of plain shapes, from mill, 1.38c.

The past week, being the last in the month, has suffered from the usual postponing of orders for the purpose of gaining an extra 30 days. Store sales were much reduced. We quote for Chicago delivery from jobbers' stock 1.75c.

Plates.—While some specifications from carbuilders are being received to cover work in progress, the plate mills are now largely dependent on the demand for tank steel. This material naturally runs to the lighter weight stock and the mills are able to make only a moderately good showing as to tonnage. There is apparently no disposition to depart from the 1.20c., Pittsburgh, basis, although there is not sufficiently attractive business offering to exert much pressure. We quote for Chicago delivery, from mill, 1.38c.

We quote for Chicago delivery of plates from store 1.75c.

Sheets.—The heavy buying of sheets that has been induced by the rapidly rising market has furnished the mills with very substantial bookings. The past week brought in a round tonnage of new business. Even higher prices than we quote are reported, and on the 2c. and 3c., Pittsburgh basis, the market stands with decided firmness. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.63c.; No. 28 black, 2.18c.; No. 28 galvanized, 3.18c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.55c.

Bars.—With one of the leading mills of this district the past week was the heaviest in point of bar specifications of any for several months. A fair demand from implement manufacturers was augmented by jobbers' purchases, and more especially by the demand for reinforcing bars. For bar iron there is little or no inquiry. Such buying as there is is limited to early delivery, as the mills will not accept business beyond the present quarter at going prices. An unusual spread now exists between steel and iron that is hardly justified on the basis of the relative adaptability of the material. We quote for mill shipments as follows: Bar iron, 1.07½c. to 1.10c.; soft steel bars, 1.38c.; hard steel bars, 1.25c. to 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—Reports are current of a hardening of the screw and bolt market, but recent quotations for business of an attractive character show prices to be about on the level last quoted. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 85; cut thread, 80-5; larger sizes, 80; machine bolts up to ⅜ x 4 in., rolled thread, 85-5; cut thread, 85; larger sizes, 80-5; coach screws, 85-10; hot pressed nuts, square head, $6.60 off per cwt.; hexagon, $7.60 off per cwt. Structural rivets, ½ to ¼ in., 1.58c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.20c.; boiler rivets, 2.30c.; machine bolts up to ⅜ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅜ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Old Material.—Those who will buy scrap at the present time can secure it at practically their own price, but the principal consumers of rolling-mill grades are showing no disposition to ask even for figures. The activity of some of the sheet mills has improved the situation as regards scrap for open-hearth use, and cast borings are somewhat stronger. Railroad malleable continues to decline and the leading consumer offers only $8.50 this week. New railroad lists of old material are limited to 12,500 tons from the Baltimore & Ohio and 6300 tons from the Chicago & Northwestern, but on these lists are included 1000 tons of No. 1 cast, 2200 tons of No. 1 wrought, and 3000 tons of old steel rails. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.00 to $12.50
Old steel rails, rerolling	11.50 to 11.75
Old steel rails, less than 3 ft.	10.25 to 10.50
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.25 to 11.50
Heavy melting steel scrap	9.50 to 9.75
Frogs, switches and guards, cut apart	9.50 to 9.75
Shoveling steel	9.00 to 9.25
Steel axle turnings	6.75 to 7.25

Per Net Ton

Iron angles and splice bars	$12.00 to $12.25
Iron arch bars and transoms	12.00 to 12.25
Steel angle bars	8.75 to 9.25
Iron car axles	16.25 to 16.75
Steel car axles	11.75 to 12.25
No. 1 railroad wrought	8.75 to 9.25
No. 2 railroad wrought	8.50 to 8.75
Cut forge	8.50 to 8.75
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.25 to 9.75
Locomotive tires, smooth	9.50 to 9.75
Machine shop turnings	5.00 to 5.50
Cast borings	4.75 to 5.25
No. 1 busheling	7.50 to 7.75
No. 2 busheling	6.00 to 6.25
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	9.50 to 9.75
Stove plate and light cast scrap	8.75 to 9.00
Grate bars	8.50 to 8.75
Railroad malleable	8.50 to 8.75
Agricultural malleable	8.00 to 8.25
Pipes and flues	6.25 to 6.50

Wire Products.—The leading interest reports a steady run of specifications for wire, but some of the other makers note a sharp contrast between the bookings last week and the exceptional volume of business in the week preceding. We have revised our prices and quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78; galvanized, $2.18; polished staples, $1.88; galvanized, $2.28, all Chicago.

Cast-Iron Pipe.—A fair tonnage of routine specifications from contractors was about the only business booked the past week. No new advertised lettings are reported. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $26; 6 to 12 in., $24; 16 in. and up, $23.50, with $1 extra for gas pipe.

Philadelphia

PHILADELPHIA, PA., September 1, 1914.

Nearly every branch of the iron and steel industry is hopefully marking time. Despite the fact that business is slow in all but one or two products, prices are firm except in the case of ferromanganese, imports of which are on the mend, causing quotations to recede from their recent abnormal hight. A good deal of hope is based on the possibility of demand for steel products from foreign countries, already indicated by inquiries received, though some of these very inquiries are the cause of conservatism in views as to what will ultimately develop. A large steel company, for instance, has such inquiries aggregating 40,000 tons, and of this amount it feels assured of the complete regularity of only 7000 tons. Makers of bars in particular find an amazing lack of definite knowledge as to specifications on the part of some of the inquiring parties and the conclusion is drawn that export agents are endeavoring to post themselves in case of future opportunity. In at least one case the price offered for semi-finished steel for export could not be considered. Inquiries of one sort or another have come from England, Scotland, Sweden, Norway and Japan. From one country, neutral in the present conflict, there came an inquiry for 40,000 rifle barrels. Unusual sales of manganese ore have taken place here. Pig iron is dull and another shipment has arrived from Nova Scotia. New demand for bars and plates has eased off a little, while structural material is quiet, but makers of these products found August a fair month in point of output. Local sheet makers are busy. Some old material prices have advanced and the others are firm.

Iron Ore.—The chief feature of interest has been the sale of at least two and possibly four cargoes of manganese ore, all of which have been bound for Germany, but were diverted to this country. In one instance a cargo which was offered here did not find a market and went to England. Some of this ore was Russian and some Brazilian. Sellers are unwilling to say more in regard to price than that the ore went at a premium, though from other sources it is said that a sale of Poti ore was made at 26c. per unit and that in another case a buyer could not be found at 27c. per unit. An eastern Pennsylvania steel company was the buyer of one cargo. The demand for other ores continues dormant, although arrivals against contracts continue to hold up. Those of last week were 12,780 tons from Cuba and 5993 tons from Sweden.

Pig Iron.—The attitude of consumers and sellers alike is one of waiting. Such buying as there is is done only as material is found to be needed and then in small quantities and distributers are exerting but little or no pressure to sell. In the last week the volume of small orders, so prevalent of late, has fallen off a little. Under the circumstances specific instances of inquiries or sales of even normal importance are difficult to find. It is now stated definitely, as we reported a week ago, that the Pennsylvania Railroad has placed orders for about 1100 tons of Lake Superior charcoal iron and it is understood also to have bought about 3000 tons of central Pennsylvania coke iron for delivery to the end of the year. The Baldwin Locomotive Works is about to close on 1000 tons of cylinder iron and a carwheel manufacturer has taken 400 tons of charcoal iron. While pipe makers have not been active as purchasers, they have in some cases made offerings for iron at a price which in one instance at least was firmly declined. In Virginia iron sales were lighter than in the preceding week, though shipments against contracts held up well and those of the month of August will show a slight increase. At the same time furnace stocks are growing. From Nova Scotia, there arrived here 2926 tons of pig iron last week. Basic shows no life. In standard low phosphorus, about 2000 tons have been sold at $21.50, Philadelphia. Lebanon low phosphorus has not moved except in insignificant lots and its quotation is unchanged at $17.50, furnace. Here and there is heard some talk of higher prices than those here quoted for eastern Pennsylvania and Virginia irons, but this is offset by the fact that iron can be had with ease at the following range which is named for standard brands, for early delivery, in buyers' yards in this district:

Eastern Penna. No. 2 X foundry	$14.75 to $15.00
Eastern Penna. No. 2 plain	14.50 to 14.75
Virginia No. 2 X foundry	15.30 to 15.50
Virginia No. 2 plain	15.05 to 15.25
Gray forge	13.75 to 14.00
Basic (nominal)	14.00
Standard low phosphorus	21.00 to 21.50

Ferroalloys.—There is evidence that this market has finished soaring for the time being and that prices are receding from the $100 per ton mark, although some agents of English producers still give that figure as the nominal price. A local seller received a cable August 29 authorizing him to sell at $90 to $95 seaboard, which included the war insurance of $2.50 per ton, extra cost of exchange and other charges of an unusual character. Another seller is getting shipments of fair regularity and they are a little in excess of what is needed to cover contracts. Still another seller is receiving material with less regularity and all of them are needed to meet contract obligations. The situation continues to be one of almost constant discussion and in many instances observations are almost unanimous. One of these is that ferromanganese will certainly be made here in sufficient quantity to meet demand if the foreign supply becomes scarce enough to make the price prohibitive. In fact at the present time any talk of a furnace starting up is at once followed by speculation as to the possibility of its going on ferromanganese, these suppositions being fostered by the recent purchases of manganese ore. It is generally believed also that should it continue to be relatively easy to get foreign material there will not be much successful effort to make high-grade ferromanganese here. In the week ended August 29 arrivals at this port from England were 1401 tons. There is less talk of spiegeleisen in this market. A local company reports that it has taken orders for 30 and 40 per cent. ferromanganese and is prepared to contract for 1915 delivery, but it has not got to the point of manufacturing as yet. Ferrosilicon quotations are unchanged at $71 to $73, Pittsburgh, for 50 per cent., according to quantity. An importation of 25 tons arrived here from England last week.

Bars.—In steel bars new business has been a little quieter in the last week, although specifications against contracts have been good. The quotation is 1.35c., delivered here for prompt business, and 1.40c. for fourth quarter, although manufacturers are not looking for forward business. One manufacturer is figuring on about 15,000 tons of billets and sheet bars, ostensibly for export, but many of these inquiries are so indefinite as to sizes and quantities that they are believed to represent efforts of export agents to post themselves in preparation for the export trade which it is hoped will come. Iron bars are a little more active, judging from the rate of operations of some of the mills, but prices are unchanged at 1.15c. to 1.20c., Philadelphia, for ordinary bars.

Plates.—Demand fell off a little in the last week as far as new business was concerned, but here again specifications kept up fairly well and a representative of an eastern Pennsylvania mill finds that its August output will be about 90 per cent. of capacity. This company has received five inquiries from England for shipbuilding and structural work, but these have not

developed as yet into orders. The mill referred to owes its good showing almost entirely to the aggregate of small orders in which it has specialized and for which a better price can be obtained, oftentimes 1.40c., Philadelphia. On the general run of business 1.35c. is quoted, but it is acknowledged that on a big lot 1.30c. might be done. In some cases highly desirable propositions are being held up, such, for instance, as 5000 tons of car plates and 2800 tons of plates for barges. Domestic shipbuilding is dull.

Structural Material.—Quotations for plain shapes range from 1.35c. to 1.40c., Philadelphia, according to quantity. New business is not good, being especially dull in the matter of large orders and most of the activity at the mills is due to specification against orders previously booked. There is talk again of an extension to the Hotel Rudolf at Atlantic City, but nothing definite is reported. Bids are in on the Pennsylvania Railroad bridge over the Allegheny River which is to take approximately 4000 tons, but no award has been announced. An eastern Pennsylvania mill secured a postponement of a few days in order to get its estimate in. About the middle of this month bids are to be opened on a bridge, also over the Allegheny, for the Baltimore & Ohio Railroad. It will involve between 8000 and 10,000 tons.

Billets.—Small orders continue to be about all that the mills are receiving. There has been some inquiry from abroad received here, as stated a week ago, but none of it has resulted in sales as yet and makers are conservative in basing hope in this direction, although they do look for some business from Great Britain, Sweden, Japan and other countries. In one case an offer for 1000 tons of slabs was regarded as too unreasonable in point of price for consideration. Quotations are unchanged at $23.40, Philadelphia, for basic open-hearth rolling steel, with forging billets $4 to $5 higher.

Sheets.—The better demand which recently developed is keeping up and makers in this territory are operating at full capacity and almost entirely on prompt delivery business. The quotation for No. 10 blue annealed sheets is 1.65c., Philadelphia.

Coke.—Market conditions are as quiet as they are in pig iron or steel products. Quotations range from $2.40 to $2.65 per net ton at oven for foundry coke and $1.75 to $1.85 for furnace coke. Freight rates to this city from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The general feeling is that existing conditions are good because of the fact that some of the mills are getting near the point where they must come into the market. Prices are not only firm, but in some cases have advanced, the materials affected being steel axles, railroad wrought, forge fire, bundled sheets and turnings. Current business, however, is light. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$10.50 to $11.00
Old steel rails, rerolling	12.00 to 12.50
Low phosphorus heavy melting steel scrap	14.00 to 14.50
Old steel axles	15.00 to 15.50
Old iron axles (nominal)	20.00 to 21.00
Old iron rails	14.00 to 14.50
Old carwheels	11.50 to 11.75
No. 1 railroad wrought	12.75 to 13.25
Wrought-iron pipe	10.50 to 11.00
No. 1 forge fire	8.50 to 9.00
Bundled sheets	8.50 to 9.00
No. 2 light iron	5.00 to 5.50
No. 2 busheling	8.00 to 8.50
Wrought turnings	8.50 to 9.00
Cast borings	8.50 to 9.00
No. 1 cast	12.00 to 12.50
Grate bars, railroad	8.00 to 8.50
Stove plate	8.25 to 8.75
Railroad malleable	9.00 to 9.50

The Newburg & South Shore Railroad has been declared by the Supreme Court a plant facility of the American Steel & Wire Company, and not a common carrier, thus sustaining a ruling of the Interstate Commerce Commission, and it will no longer be entitled to receive any proportion of freight receipts from connecting lines. The Ohio Utilities Commission is reversed by this decision.

Cleveland

CLEVELAND, OHIO, September 1, 1914.

Iron Ore.—One 15,000-ton sale is reported, but a few other inquiries for small lots that have come out recently have not resulted in orders. Owners of underground mines would like to clean up some of the large stock prices that they have on hand, but have about given up hope of any further sales this season. Shipments are gradually falling off and the September movement will be considerably lighter than in the summer months. Lake traffic is in an unsatisfactory condition and more boats will probably be tied up. We quote prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3.00; Mesaba non-Bessemer, $2.85.

Pig Iron.—The market is exceedingly dull. The foundry melt has fallen off because of conditions resulting from the European war. Makers of some products in which there is normally a good European trade find their markets shut off, and as a result have suspended orders for castings. The only inquiry of any size is from the Massillon Iron & Steel Company, Massillon, Ohio, for 4000 tons of foundry iron, including 1800 tons of No. 3, 1100 tons of No. 4 and 1100 tons of gray forge for delivery during the remainder of the year. Some consumers of Southern iron are feeling the market on prices for the first half and would be willing to contract for that delivery at $10.25, Birmingham, the present minimum price for No. 2 for this year's delivery, but some producers are unwilling to quote prices for the first half and others are asking $11. Sellers are complaining because consumers are holding back on shipments of Southern iron to get the benefit of the lower freight rates, which go into effect October 1. On that date the freight rate on Southern iron for shipment to points north of the Ohio River will be reduced 35c. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	$13.75 to 13.90
Northern No. 2 foundry	13.75
Southern No. 2 foundry	14.60
Gray forge	13.25
Jackson Co. silvery, 8 per cent. silicon	17.55
Standard low phosphorus, Valley furnace	20.25

Coke.—There is no demand for furnace grades and only a few orders for small lots of foundry coke. While some of the best known makes of foundry coke are being sold at $2.50 per net ton at oven, there is considerable surplus coke and good makes can be had at $2.20 to $2.25 for prompt shipment. We quote standard furnace coke at $1.70 to $1.75 for prompt shipment.

Finished Iron and Steel.—General feeling in the trade is optimistic. There is a fair volume of specifications, but new inquiry is light. Prices on steel bars, plates and structural material appear to be well maintained at 1.20c., Pittsburgh. Local mills are comfortably filled with orders for plates and sheets. The Otis Steel Company will place its new Cleveland plant in operation some time this month. This plant will roll material from ¼ in. plates down to No. 18 gauge black and blue annealed sheets. New structural work that will be placed shortly includes a round tonnage for the Clark Avenue bridge in Cleveland and 1500 tons for a new building for the East Ohio Gas Company, the general contract for this building having been placed with James Stewart & Co., New York and Cleveland. The sheet market continues fairly active and prices are firm. Several mills are now quoting No. 28 black at 2c. and No. 28 galvanized at 3c., but orders are still being placed at 1.95c. for black and 2.90c. for galvanized. The demand for iron bars shows an improvement and prices appear to be somewhat firmer. We quote iron bars at 1.15c. to 1.20c., Cleveland, for outside shipment, and 1.30c. for local delivery. Stock prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—The new demand is not active, but regular prices appear to be well maintained. Rivet prices are unchanged at 1.50c. for structural and 1.60c. for boiler rivets for car lots. Most consumers of both bolts and nuts and rivets are under contract. We quote discounts as follows: Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 80 and 20 per

cent.; cut thread, 80 and 15 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h. p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 25 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 per cent.; coach and lag screws, 80 and 25 per cent.; square h. p. nuts, blank or tapped, $6.30 off; hexagon h. p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9/16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—Scrap is moving more freely, owing to the fact that Youngstown mills are again taking shipments and the embargo against the American Rolling Mill Company has been lifted. The available supply is large and sellers are crowding the mills with shipments. The demand is very dull. Some consumers are buying small lots at as low prices and in some cases slightly lower than have been prevailing recently. For heavy melting steel, $10 to $10.25 is being offered by Cleveland mills and $11 to $11.25 in Youngstown. Yard dealers have large stocks which they are holding for better prices. While some dealers expect that the advance in steel prices will cause a stiffening in the scrap market others look for a slight further decline before advance comes. The Baltimore & Ohio received bids to-day for about 12,000 tons of scrap and the Erie Railroad will close to-morrow on its usual list. We quote f.o.b. Cleveland, as follows:

	Per Gross Ton	
Old steel rails, rerolling	$11.50 to	$12.00
Old iron rails	13.00 to	13.50
Steel car axles	15.00 to	15.25
Heavy melting steel	10.00 to	10.25
Old carwheels	11.25 to	11.50
Relaying rails, 50 lb. and over	23.00 to	25.00
Agricultural malleable	8.50 to	9.00
Railroad malleable	10.25 to	10.75
Light bundled sheet scrap	7.50 to	8.00
	Per Net Ton	
Iron car axles	$17.00 to	$17.25
Cast borings	5.75 to	6.00
Iron and steel turnings and drillings	5.25 to	5.50
Steel axle turnings	6.75 to	7.25
No. 1 busheling, new	8.25 to	8.50
No. 1 busheling, old		8.25
No. 1 railroad wrought	9.50 to	10.00
No. 1 cast	10.50 to	10.75
Stove plate	7.50 to	8.00

Buffalo

BUFFALO, N. Y., September 1, 1914.

Pig Iron.—The encouraging feature is that shipments are going out in large volume on contracts, and while some producers characterize new ordering as slack, others report a good volume of new business. One order of about 3000 tons, foundry grades, is reported from a foundry in the central portion of the state manufacturing specialties. Another foundry further down the state has placed an order for 1500 tons of foundry grades, and there have been various other sales running from carloads to 200 ton lots, aggregating probably 7000 to 8000 tons, for the week. The American Malleable Company's plant, Lancaster, N. Y., has received a large order for castings from the Lackawanna Railroad. Negotiations for 3000 tons of malleable pig iron for the American Malleable Company are now under way with local iron producers. Price schedules still show a wide range, as quoted by the several producing interests of the district. It is stated that one furnace interest is willing to sell No. 2 X at $13, furnace, and even at $12.75 for especially attractive tonnages. Reports from other furnaces show a general range of prices of $13.50 to $14.25, according to silicon content and attending circumstances as to delivery, credits and particular grades of iron required. We quote as follows, f.o.b. furnace for last half delivery:

No. 1 foundry	$13.25 to	$14.00
No. 2 X foundry	13.00 to	13.75
No. 2 plain	12.75 to	13.75
No. 3 foundry	12.75 to	13.50
Gray forge	12.75 to	13.25
Malleable	13.00 to	14.00
Basic	14.00 to	14.25
Charcoal, regular brands and analysis	16.25 to	17.25
Charcoal, special brands and analysis		20.50

Finished Iron and Steel.—Most selling agencies report August specifications approximately equal in volume to the specifications in July, and that all unspecified August quotas on contracts placed before the recent advances in prices have been canceled. Contracts are now being placed by users who had not already covered requirements prior to the recent advances at 1.25c. for bars, plates and shapes. One interest reports selling a large tonnage of steel bars for the central part of the state for delivery during fourth quarter and first quarter of 1915 at better than to-day's prices. Specific inquiries for bar material for deliveries to be made in November and December are being received, users evidently anticipating that higher prices are likely to prevail. For current delivery nothing below 1.20c. is accepted. In Canada the situation is very gloomy, many manufacturers having closed their plants in part, particularly agricultural implement makers for export. In several instances it is reported plants will remain closed until the first of the year, by which time it is hoped specifications for home consumption will have accumulated in sufficient volume to justify reopening. Bids are being taken for 250 tons of steel for Rumsey & Co., Seneca Falls, N. Y. The Buffalo Structural Steel Company was low bidder for 240 tons for public school No. 54, Buffalo. The American Bridge Company has taken the contract for a steel viaduct, Albany, 433 tons, and for a bridge at Amsterdam, 834 tons. The Massillon Bridge & Structural Company has a 200-ton contract for a highway bridge near Rotterdam, N. Y.

Old Material.—The market is still affected by the feeling of uncertainty regarding the bearing the European war will have upon the future. Shipments on contracts are being made in fair volume, but with the exception of turning and borings, which are scarce, owing to curtailment in producers shops, there is not much demand in any line. Prices are not quotably changed, although heavy melting steel is a shade weaker. We quote dealers selling prices as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.25 to	$10.50
Low phosphorus steel	14.00 to	14.50
Boiler plate sheared	11.50 to	12.00
No. 1 railroad wrought scrap	10.00 to	10.50
No. 1 railroad and machinery cast	10.25 to	10.75
Old steel axles	12.50 to	13.00
Old iron axles	19.50 to	20.00
Old carwheels	11.00 to	11.50
Railroad malleable	9.25 to	9.75
Machine shop turnings	5.50 to	6.00
Heavy axle turnings	7.50 to	8.25
Clean cast borings	6.00 to	6.50
Old iron rails	13.00 to	13.75
Locomotive grate bars	8.50 to	9.00
Stove plate (net ton)	9.00 to	9.75
Wrought pipe	7.50 to	8.00
Bundled sheet scrap	6.25 to	6.50
No. 1 busheling scrap	8.25 to	8.75
No. 2 busheling scrap	5.75 to	6.25
Bundled tin scrap		10.50

Cincinnati

CINCINNATI, OHIO, September 2, 1914.—(*By Wire.*)

The railroads are now issuing through bills of lading on shipments to Europe with the exception of Germany. This action has had a beneficial effect on the machinery trade, and a number of shipments are going forward on old orders that have been held up, among them being two carloads of conveying equipment shipped by a local company to an English customer.

Pig Iron.—No changes are to be noted either in the demand from new customers or in the amount of iron moving on old contracts. As to the latter proposition there is considerable complaint of shipments being held up, but there seems to be an understanding on the part of furnace interests that consumers are absorbing all that they possibly can and no drastic measures are employed to force on buyers more iron than they can take care of at this time. The two malleable inquiries mentioned last week are yet unclosed, and a third one for 1000 tons from a Michigan manufacturer is now before the trade. A central Ohio melter wants 500 tons of standard Bessemer, and 4000 tons of foundry iron is asked for by a northern Ohio consumer, all for this year's shipment. Interest in next year's prices has abated somewhat and consumers seem to be content to await a move on the part of the furnaces in this matter. Sales are still confined to small tonnages, and the only one made to a nearby melter worthy of mention is 300 tons of Southern iron at $10.25 for third quarter ship-

ment. Southern No. 2 foundry is quoted at $10 to $10.25, Birmingham basis, and Northern foundry and malleable at $13, Ironton. Union furnace blew out August 31. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$13.75 to $14.25
Southern coke, No. 2 f'dry and 2 soft	13.25 to 13.75
Southern coke, No. 3 foundry	12.75 to 13.25
Southern No. 4 foundry	12.25 to 12.75
Southern gray forge	11.75 to 12.25
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.20 to 15.70
Southern Ohio coke, No. 2	14.20 to 14.70
Southern Ohio coke, No. 3	13.95 to 14.20
Southern Ohio malleable Bessemer	14.20
Basic, Northern	14.45 to 14.95
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail.)

Coke.—Little new business is being transacted and there are no inquiries out for anything more than carload lots from any source. The best grades of 48-hr. Connellsville coke are quoted around $1.90 to $2 a net ton at oven, but some brands are obtainable at $1.75 for any shipment this year. Wise County and Pocahontas makers are quoting 10c. to 25c. a ton higher, but, as far as known, are doing no business. Foundry coke is quoted at prices that are close to those named on furnace coke. In all three fields $2.25 per net ton at oven can be done for this year's shipment, with a few producers asking 25c. a ton higher.

Finished Material.—The general situation is more encouraging in several lines. Both black and galvanized sheets are in good demand, and the increasing number of specifications for shipments to apply on old contracts is taken as a favorable sign that business is fast being adjusted to new conditions that have been created by the European war. Prices are firm at 2c., Pittsburgh basis, on No. 28 black sheets, and 3c. on galvanized. No. 10 blue annealed sheets are quoted at 1.45c. Pittsburgh. At even these prices no long-time contracts are solicited by any of the rolling mills in this vicinity. Structural material is quiet, and this also applies to steel bars. The local warehouse quotations on both steel bars and small structural shapes remain around 1.80c. to 1.85c.

Old Material.—The situation is unchanged, with a lagging demand for small quantities of scrap iron, and that from only a comparatively few consumers. No improvement is anticipated until the consumption of scrap is increased, and there are no indications of any change for the better in this market. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b at yards:

Per Gross Ton

Bundled sheet scrap	$6.75 to $7.25
Old iron rails	11.75 to 12.25
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	10.75 to 11.25
Melting steel rails	9.25 to 9.75
Old carwheels	10.25 to 10.75

Per Net Ton

No. 1 railroad wrought	$8.75 to $9.25
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.25
Railroad cast scrap	9.25 to 9.75
No. 1 machinery cast scrap	10.25 to 11.25
Burnt scrap	6.00 to 6.75
Old iron axles	15.50 to 16.00
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	6.25 to 6.75
Malleable and steel scrap	7.25 to 7.75
Railroad tank and sheet scrap	5.25 to 5.75

Boston

BOSTON, MASS., September 1, 1914.

Old Material.—The dealers report conditions as much more hopeful. The higher prices quoted last week were due largely to the covering of old orders, but nevertheless the feeling is optimistic, dealers expecting a marked increase in demand and a lifting of values. They have put up pipe another 25c. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. per ton more than dealers' prices.

Heavy melting steel	$8.50 to $8.75
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.00 to 12.25
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	8.00 to 8.25
Cotton ties (bundled)	6.25 to 6.50
No. 2 light	3.75 to 4.25
Wrought turnings	5.00 to 5.50
Cast borings	5.25 to 5.75
Machinery cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	5.25 to 5.50
Cast-iron carwheels	11.00 to 11.25

Birmingham

BIRMINGHAM, ALA., August 31, 1914.

Pig Iron.—The local market has experienced an uneventful week. Orders have been comparatively light. Reports of enormous sales in August have not been verified. The Sloss-Sheffield Company sold over 70,000 tons, but sales by others did not approach that record in volume. The leading maker continues to quote $10 openly, and this would seem to warrant the conclusion that some of the others must have parted with pig iron on the same basis. One concern, which is well sold up for the remainder of the year and is scarce on everything except No. 1 foundry and analysis iron, is asking $10.50, and it is claimed that it recently sold 1000 tons at that price. There is no doubt that a considerable quantity of iron has brought $10.25. Some apprehension is felt regarding retention of the newly won Middle Western field owing to the disposition of Chicago makers to underquote Birmingham prices for delivery in October after the reduced freight rate becomes effective. There have been no stop orders incident to the European war, but stocks are still large. At the beginning of August they amounted to 190,000 tons of foundry and 25,000 tons of other irons, and it is not believed they were greatly reduced during the month. The steel works are operating on full time, which means continued activity in the output of basic metal. Foundry operations appear to be on about the same level as a month ago. The iron output in September will be about the same as in August. The total car movement out of Alabama in July showed a decrease over preceding months this year and the corresponding month last year. This does not indicate heavy iron shipments. Conditions now seem to point to a return to hand-to-mouth purchases. We quote, per gross ton, f.o.b. Birmingham furnaces, minimum and maximum, as follows:

No. 1 foundry and soft	$10.50 to $11.00
No. 2 foundry and soft	10.00 to 10.50
No. 3 foundry	9.50 to 10.00
No. 4 foundry	9.25 to 9.75
Gray forge	9.00 to 9.50
Basic	10.00 to 10.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—The water and gas pipe manufacturers are operating on the same increased scale inaugurated several weeks ago, but without indications of getting up to capacity. The leading interest is delivering a large consignment of 36-in. pipe to Panama from its Bessemer plant and has booked an order for 600 tons for the Tuscaloosa waterworks, to be made at the Chattanooga plant. Sanitary pipe works are suffering from a dearth of building operations. Pipe makers have begun an effort to have the freight rate to San Francisco reduced so as to keep the trade on the coast, now threatened by a rate of $6 per ton from New York via Panama. They are asking for the export rate of $1.90 to New Orleans to apply on these shipments instead of the present domestic rate of $3. We quote, per net ton, f.o.b. shops, as follows: 4-in., $20.50; 6-in. and upward, $18.50. Gas pipe, $1 more.

Coal and Coke.—There is little comforting in the coal and coke markets except that prices have not yet been affected. The declaration of moratoriums abroad has had the effect of inducing Birmingham bunker coal dealers to decline business at Mobile and New Orleans. As far as South America is concerned, there is no

disposition to seek business there until American banks have established financial facilities. The dearth of ships on the gulf continues, there being none booked to leave Pensacola, for instance, until October. Coke is moving slowly, but prices are unchanged. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $3; foundry, $3.45 to $3.65.

Old Material.—Outside of a fair demand for steel scrap, dealers report little business. Nominal quotations, per gross ton, f.o.b. dealers' yards, are as follows:

Old iron axles	$14.50 to $15.00
Old steel axles	14.50 to 15.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought	10.00 to 11.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	9.00 to 10.00
No. 2 country wrought	8.00 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	9.50 to 10.00
Standard carwheels	10.50 to 11.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., August 31, 1914.

An improved state of mind is noted in all divisions of the iron and steel market and there is freer buying, though along conservative lines, with a disposition to avoid distant commitments for a little longer period.

Pig Iron.—Sales have been more numerous and in larger lots than for several weeks. Prices are being held more firmly. Sales include lots of 100 tons, 150 tons, 200 tons, 250 tons and one of 500 tons, together with a considerable number of carload lots plainly indicative of immediate need by melters, who are striving to wait for a more settled state of affairs.

Coke.—Transactions have all been of the small lot order and have commanded 10 to 25c. per ton more than market quotations for good sized purchases. Byproduct coke is quotable at $5.10 to $5.20 St. Louis delivery.

Finished Iron and Steel.—Prices are firm and orders are reported very good considering the general conditions. Specifications on contracts are numerous but not individually large. The only large bit of business in immediate sight is the Oklahoma State Capitol which will call for about 3000 tons of reinforcing bars. Movement of stock out of warehouse is in fair volume all things considered, the prices quoted being as follows: Soft steel bars, 1.70c.; structural shapes and tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, 2.55c.; No. 28 galvanized sheets, 3.55c.

Old Material.—There is a better feeling, largely due to the better situation in the finished product market and the increased willingness of mills to take rolling grades, etc. Consumption, however, has not demonstrated itself in sufficient volume to increase the prices. The only list of importance out this week is one from the Missouri Pacific of 1450 tons. Relaying rails are quite strong and in better demand. We quote dealers' prices f.o.b. St. Louis as follows:

Per Gross Ton

Old iron rails	$11.00 to $11.25
Old steel rails, rerolling	11.25 to 11.50
Old steel rails, less than 3 ft.	10.50 to 10.75
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	11.00 to 11.25
No. 1 railroad heavy melting steel scrap	10.50 to 10.75
Shoveling steel	8.00 to 8.75
Frogs, switches and guards cut apart	10.50 to 10.75
Bundled sheet scrap	5.00 to 5.25

Per Net Ton

Iron angle bars	$10.00 to $10.50
Steel angle bars	9.25 to 9.50
Iron car axles	16.75 to 17.25
Steel car axles	11.75 to 12.25
Wrought arch bars and transoms	11.00 to 11.50
No. 1 railroad wrought	8.00 to 8.25
No. 2 railroad wrought	8.00 to 8.25
Railroad springs	9.25 to 9.50
Steel couplers and knuckles	9.25 to 9.50
Locomotive tires, 42 in. and over, smooth	8.75 to 9.25
No. 1 dealers' forge	7.75 to 8.00
Mixed borings	4.00 to 4.25
No. 1 busheling	7.25 to 7.50
No. 1 boilers, cut to sheets and rings	5.75 to 6.25
No. 1 cast scrap	9.50 to 10.00
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.50 to 8.00
Pipes and flues	5.75 to 6.25
Railroad sheet and tank scrap	5.75 to 6.00
Railroad grate bars	7.25 to 7.50
Machine shop turnings	5.00 to 5.25

San Francisco

SAN FRANCISCO, CAL., August 25, 1914.

Trade is still in an unsettled condition, with some important factors tending to stimulate and others to retard the market. Except for turning the demand from European to domestic producers, the effects of the war have been so far decidedly adverse—delaying new improvements and hampering the crop movement and circulation of money. Both merchants and manufacturers are somewhat dubious about the future, and in most cases cautious in buying. The long-standing paucity of stock, however, together with present low freight charges and advancing prices, make some increase in purchases desirable. In view of these conflicting tendencies, and variance in the ideas of different buyers, it is extremely difficult to gauge the extent of the current movement. The movement to replace foreign importations seems to be about over for the present, but there is a little more scattered buying in lines not imported, indicating a conservative replenishing of stocks at the Panama Canal rate. Country jobbing trade shows some improvement, and resale prices have a strong upward tendency.

Bars.—Several shipments of foreign bars have arrived within the last fortnight, and the outlook is rather favorable for such material as was afloat at the beginning of August. This, together with such orders as have already been placed with domestic mills, is expected to take care of the principal requirements to the end of this quarter, if not for the rest of the year. A largely increased consuming demand might bring renewed interest, but for the present merchants prefer to await developments. The jobbing movement, according to some reports, is now running ahead of last year, and the resale price, though not firmly established, is about 2.20c. to 2.25c. Bars for direct shipment from mill are still quoted on the basis of 1.20c., Pittsburgh.

Structural Material.—The recent buying movement in plain material has quieted down, and the local situation is decidedly quiet, with fabricators showing considerable anxiety for business. The differential in favor of plain material by the Panama route will tend to hamper Eastern fabricators in this district. The Union Iron Works, which has purchased plain material for a foundry building, will not have it fabricated at present. Figures are being taken for the Phelan residence, this city; a seven-story hotel at Sixth and Broadway, Oakland, and a good-sized job at Honolulu for the American Can Company. Bids will soon be called for on the Alameda County infirmary, consisting of 13 two-story class A buildings. Figures are also being taken for a small bridge at Sacramento, and plans are going ahead for a large bridge over the Sacramento River near Rio Vista. Plain material for shipment is quoted at 1.20c., Pittsburgh.

Rails.—The local demand is quiet, with no business of any consequence in light rails, but a fair number of small orders for standard sections, with further business of a scattering nature in prospect.

Plates.—Buying by merchants and manufacturers to cover the requirements of the next few months has been fairly active. A great deal of general tank construction is in progress for the oil interests, and the need for increased storage capacity is expected to result in further business. Plates for prompt shipment are quoted on the basis of 1.20c., Pittsburgh.

Sheets.—The jobbing trade is opening up rather better than was expected, in view of general conditions, and the demand from merchants is larger than for some time. Stocks have been allowed to run rather low, and, with stiffening prices and freight rates as low as they are likely to be, there is a well-defined tendency to increase the supply on hand. A few mills are now booking contracts for the fourth quarter, and are getting a fair business, though the principal demand has been for early shipment. Business can be called active only in comparison with the recent dullness, as buyers are not loading up heavily. For early shipment, local agents are quoting 2c., Pittsburgh, for No. 28 black, and 2.90c. for galvanized. No. 10 blue annealed sheets remain at 1.40c., Pittsburgh.

Standard Pipe.—The revival of demand has lately extended to this department, and the August tonnage will be the largest in many months, though as far as can be learned no really large stocks are being accumulated. The improvement is attributed to the reduction of freight rates, merchants having kept their stocks unusually low prior to the opening of the Panama Canal. Jobbing business in the country is fairly active for the season, but some doubt is felt as to the future. Oil field business remains dull.

Cast-Iron Pipe.—San Diego will take bids August 31 for about 200 tons, and the town of Grass Valley is in the market for a carload, this being about all the municipal business immediately in sight. Prices are quoted at $32 per net ton for 6-in. and over, $34 for 4-in., and $1 extra for gas pipe.

Pig Iron.—The local market remains sluggish and uncertain. Recent inquiries from Japan are regarded as merely feelers to see what could be done in case of emergency. Importers are at the moment unable to get much information as to the prospect of further shipments from foreign sources, but so far there has been no shortage, and prospects are good for the arrival of shipments now afloat. Importers are unwilling to quote prices, all sales being made at private terms, but it is stated that there has been no advance. Balfour, Guthrie & Co., who now represent the Tata Iron & Steel Company, Calcutta, are bringing in frequent shipments, and have had no intimation of an interruption of supplies from that source. This is a high-manganese iron, which works to advantage with local scrap, and is making some headway in this market. Very little Southern iron is coming in.

Coke.—A good-sized shipment of German Syndicate coke has arrived here, but supplies are limited, and prices are firmly held, spot offerings being quoted at about $14 per net ton. No movement of American coke has started as yet, but is expected before long.

Old Material.—A little more demand is noted for cast-iron scrap, some having been sold at $16.50 per net ton, and holders expect a further advance. A good-sized sale of steel melting scrap is reported at private terms, but the market is rather unsettled at present. Buyers are disposed to hold off as long as possible, while holders believe the elimination of foreign bars from the market will enable them to get higher prices.

J. H. Gilhuly, San Francisco sales agent for the Youngstown Sheet & Tube Company, with whom the order was placed for the Dutch Shell Company's pipe line, announces that manufacturing on this order has commenced, and shipments will start within the next fortnight.

British Markets Firmer

Pig Iron Slightly Improved—Steel Firm—Ferromanganese Exports May Be Prohibited

(*By Cable*)

LONDON, ENGLAND, September 2, 1914.

Ferromanganese is quiet, with prices unchanged. Plenty of ore is available, but our Government is considering the complete prohibition of exports of ferromanganese owing to the temptation to makers to sell to America instead of to the home trade because of famine prices in the United States. This has apparently induced certain makers to name the same price for home as for America. Pig iron is rather irregular, but the tone on the whole is slightly improved. Exports of pig iron, however, are much curtailed, the shipments from Scotland, Cleveland and Cumberland to date showing a loss of 112,000 tons as compared with the same time last year. Furnaces in blast in the three districts number 151, against 201 at the same time last year. Stocks of pig iron in Connal's stores are 95,703 gross tons, against 93,793 tons last week. A trifle more buying of warrants is observed, but no decisive movement is seen in the demand. Not much is doing in tin plates, but a little Canadian inquiry is being received. Semi-finished steel is firm, but no trace of American selling appears. No alteration has been made in the finished steel situation, but the tendency is firm. Such quotations as are available are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. ($3.16) upward.

Cleveland pig-iron warrants (Tuesday), 51s. 5d. ($12.52), against 51s. 3½d. ($12.49) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s. 9d. ($12.59), against 51s. 6d. ($12.53) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 10s. ($46.22).

Steel ship plates, Scotch, delivered local yards, £6 15s. ($32.84).

Steel rails, export, f.o.b. works port, £6 12s. 6d. ($32.23).

Hematite pig iron, f.o.b. Tees, 70s. ($17.03).

Sheet bars (Welsh), £5 5s. to £5 10s. ($25.55 to $26.76), delivered at works in Swansea Valley.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £7 ($34.06), against £6 17s. 6d. ($33.45) last week.

Steel bars, export, f.o.b. Clyde, £7 2s. 6d. ($34.67), against £5 15s. ($27.98) July 30, the last quotation.

Manganese Ore Plentiful — Situation as to the Metal—Tin Plate Output Cut One-Half

(*By Mail*)

LONDON, ENGLAND, August 21, 1914.

The reopening of the Glasgow pig-iron market has not been followed by any startling developments, but warrant prices have undergone a considerable appreciation, though the top rates have not been sustained. There is a very fair inquiry for pig iron in all parts of the country and furnaces are not anxious to do business at current quotations for they are of the opinion that higher figures yet are in store, and that before very long. In the Cleveland market a fair trade is being done on home account, but there is complete stagnation in shipments abroad. There has been an interruption even of the clearances to Scotch ports, but these are now being resumed, and there is even a chance of something being cleared for Japan in the next few days. The general tendency is to sit tight and await events. The stoppage of shipments has been a serious matter for the Cleveland iron masters, but the successful passage across the North Sea of provision boats from Scandinavia renders it at least possible for some shipments of iron to be made to these quarters. There is nothing doing with Italy, and this is a rather important customer of the Tees in normal times. Real relief as regards the overseas markets is only to be looked for when the North Sea is swept clear of the German fleet. Labor is short, of course, owing to our reserves being called up, and naturally consumption must suffer, but already ore cargoes which should have gone to Germany have been diverted here, and the result is that we may have considerable supplies of ore—supplies even in excess of requirements.

The hematite position is one of the utmost strength and very large sales have been made to the steel trade since the war began. Early this week East Coast mixed numbers sold at 72s. 6d. ($17.64) and makers now ask 75s. ($18.25) f.o.b. The demand for the moment appears to be satisfied. The upward trend in prices was due partly, of course, to the suspension of shipments from Spain, but things are resuming the normal, now that it is believed that the Channel and Bay of Biscay are free from the danger of capture by German cruisers.

THE FERROMANGANESE SITUATION

Ferromanganese has been exceedingly strong, as already advised you by cable. Makers are very reluctant to contract, and are only willing to make sales of comparatively small lots for fixed shipment. Nothing in the way of three or six months' contracts for so much a month will be looked at. Ore problems have been troubling the trade, which is also bothered by the scarcity of labor. A quantity of Poti ore originally sold to the Continent has been ordered here and Indian ore which otherwise would have gone to Germany is also coming here. This should insure an easing of prices. Germany will probably not want ore for a long time to come. Some of the American buyers of German ferro are awkwardly situated. They have been busy for months deferring deliveries, and at their request and to the great inconvenience of people on this side these have been withheld. As soon as the war cloud

got thick they demanded all the arrears to be shipped forthwith (if not sooner) and coupled to this a demand that the forward shipments should immediately be put under way. All this is, of course, impossible and America must go without her German ferro. To what extent she can get the English product remains to be seen. It is unwise to dogmatize, but the chances are not exactly brilliant, for our works are full up and running very short-handed. The only dead certain thing is that there will be no Continental ferro available for export for many months.

In semi-finished products the cutting off of all Continental supplies has forced up prices vigorously and Welsh bars have just been officially lifted to £5 5s ($25.55) a ton delivered to local consumers. Some makers ask as much as £6 ($29.20). A lot of buying was done to replace German, Belgian and French material at £5 ($24.33) to £5 5s ($25.55) and business is still being done by works which were slow to appreciate the position. At the same time the fact that practically every galvanized sheet works in the country is stopped for spelter, and that there is to be a curtailment of tin plate output by 50 per cent., reflects a decidedly lessened consumption of semi-finished steel.

The position of finished iron is, of course, dominated by the withdrawal of all Belgian supplies. Marked bars are in strong request and a capital demand is experienced for the commoner qualities. Finished sheet is also strong, and makers are only willing to book limited quantities even at the ruling prices. War is a wretched thing, but the elimination for all practical purposes of the whole of the Continental works promises to be a factor exerting influences at present beyond all calculation. Quite a lot of business has been done and works are in a number of cases only leaving offers open for a limited time.

The Tin Plate Conference has just agreed to suspend all payments into the pool and to suspend all payments out of the funds for the time being. This is read as indicating a collapse of the organization, but the forecast may be unduly pessimistic. The make is to be reduced by 50 per cent. and a recommendation has been passed that the price of tin plates 20 x 14 f.o.b. Wales should be 13s. 6d. ($3.28) and that of Welsh tin plate bars £5 5s. ($25.55) delivered to local users.

New York

NEW YORK, September 2, 1914.

Pig Iron.—Purchases of about 5000 tons by a pipe foundry company in eastern Pennsylvania represent the principal business locally in the past week. It is understood that the greater part of the purchase consisted of No. 2 plain iron and that the bids of the companies taking the business were from 50 cents to 75 cents below what has recently been considered the market. A considerable number of furnaces in eastern Pennsylvania and in other districts were in competition. A 3000-ton purchase of malleable pig iron has been made for a Lancaster (N. Y.) brake shoe plant, and an inquiry is out for 2000 tons for a Michigan foundry belonging to the same interest. Generally, buying is very light and there are no developments indicating a larger scale of foundry operations in the near future. In the past month the tendency has been rather toward greater slackness. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $14.75 to $15; No. 2 X, $14.25 to $14.50; No. 2 plain, $14 to $14.25. Southern iron is quoted at $14.75 to $15 for No. 1 and $14.25 to $14.50 for No. 2.

Ferroalloys.—One shipment of several hundred tons of English ferromanganese reached the Atlantic seaboard in the past week, representing deliveries on existing contracts. The market is in a good deal of turmoil over the different conditions under which deliveries are promised on the contracts existing with five English companies which have sold ferromanganese in this country. In one case a bonus of $15 a ton is asked to insure shipments. Two other companies, as already stated in this column, have announced that they will make deliveries as far as possible under their contracts, with the proviso that the buyer pay for war risk insurance. Some buyers have been quite willing to pay the larger bonus asked in order to insure shipment. Several cargoes of ferromanganese are reported on the way to this country from England, and on their arrival the trade will be able to know the exact facts as to the conditions under which contract deliveries are being made. The possibility of a British Government embargo on ferromanganese is still mentioned, but it is certainly not operative as yet. Some sales of electric ferromanganese are reported for future delivery. While $100 is still named as the probable basis of spot sales, no such sales are reported. For future delivery some sales have been made at $85. Quotations for 50 per cent. ferrosilicon are unchanged at $71 to $73, Pittsburgh.

Finished Iron and Steel.—In spite of the light new demand, or perhaps because of it, prices are held strongly with the possible exception of steel plates, on which 1.15c., Pittsburgh, appears occasionally to be done where there is a freight rate advantage to the mill and when what business is involved can definitely be obtained in this way. The difficulty in financing new work continues to be the outstanding factor and the abandonment of projects is materially lessening the volume of steel work on which the trade has been figuring. Specifications on contracts are good, and some mills are well engaged on material which averages 1.15c. Pittsburgh. Some of the new projects requiring structural steel include 1500 tons for the Essex power house for the Public Service Corporation of New Jersey, on which bids are to be taken in a few days; a mail service and loft building, so called, for the New York Central, Forty-fifh street and Lexington avenue, on which bids are asked September 4; St. Giles Hospital, President street, Brooklyn, bids to be received September 9; about 200 tons for St. Thomas school, St. Nicholas avenue; a court house in Richmond, Staten Island; 400 tons for the Hebrew Technical Institute; public school No. 5, Jersey City, bids to be taken September 16, and public school No. 55, Bronx. In railroad cars it is doubtful that there are more than 7000 cars under consideration by the car builders, and of these 4600 are for the Southern Pacific and 1500, now up for some time, for the Wabash. The Levering & Garrigues Company has taken 400 tons for a factory building, Newburgh; the Dover Boiler Works 250 tons for the Nassau County court house, and the National Bridge Works 300 tons for the Sturges apartment and 175 tons for a building at 17 East Forty-eighth street. The Honolulu Iron Works will place 2000 tons for extension of sugar plant in Cuba. In railroad cars about the only transaction of any size was for the Rutland Railroad, awarded to the Standard Steel Car Company, the number of cars for which may be increased to a total of 100. We quote mill shipments of steel bars, plates and shapes, 1.20c., Pittsburgh, or 1.36c., New York. We quote iron bars at 1.25c. to 1.30c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plates and structural material at 1.85c. to 1.90c.

Cast-Iron Pipe.—The city of Yonkers, N. Y., will open bids September 8 on 300 tons of 8-in. No other municipal lettings of importance are in sight in this immediate territory. Private buying is slightly more active. Pipe manufacturers also report the receipt of inquiries from all over the world. Prices are being asked for shipments from stock. A good export business could be done if vessel facilities could be obtained. Efforts are being made in this direction and it is hoped that the way will soon be open for taking advantage of the foreign demand. The first cast-iron pipe going through the Panama Canal is a shipment made by the Warren Foundry & Machine Company for California. Financial reports of pipe companies now coming out show losses, thus verifying frequent complaints by manufacturers that prices received have been unremunerative. Notwithstanding this, prices show no improvement, competition still being sharp. Quotations on carload lots of 6-in. are about $20.50 to $21 per net ton, tidewater.

Old Material.—A sale of a round lot of heavy melting steel scrap has been made to a steel company in eastern Pennsylvania at $10.50, delivered. This is claimed to be the outside price now being paid for this

class of material. A few dealers having contracts to be filled are purchasing small quantities, but the demand from this source is not heavy. Other classes of old material are in slight demand, but dealers continue hopeful that consumers will shortly be compelled to come in the market, as their stocks are said to be running low. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	$8.00 to $8.50
Heavy melting steel scrap	8.00 to 8.50
Relaying rails	20.50 to 21.00
Rerolling rails	10.25 to 10.75
Iron car axles	17.25 to 17.75
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	10.75 to 11.25
Wrought-iron track scrap	9.25 to 9.75
No. 1 yard wrought, long	8.50 to 9.00
No. 1 yard wrought, short	8.00 to 8.50
Light iron	3.25 to 3.50
Cast borings	6.50 to 7.00
Wrought turnings	6.00 to 6.50
Wrought pipe	8.00 to 8.50
Carwheels	9.50 to 10.00
No. 1 heavy cast, broken up	10.25 to 10.75
Stove plate	7.75 to 8.25
Locomotive grate bars	6.25 to 6.75
Malleable cast	7.50 to 8.00

Metal Market

NEW YORK, September 2, 1914.

The Week's Prices

	Copper, New York			—Lead—		—Spelter—
	Cents Per Pound for Early Delivery					
		Electro-	Tin,	New	St.	New	St.
Aug.	Lake	lytic	New York	York	Louis	York	Louis
26	13.00	12.37½	39.00	3.87½	3.72½	6.05	5.90
27	13.00	12.37½	39.25	3.87½	3.72½	6.05	5.90
28	13.00	12.37½	39.00	3.87½	3.72½	6.05	5.90
29	13.00	12.37½	38.75	3.87½	3.72½	6.05	5.90
31	13.00	12.37½	38.50	3.87½	3.72½	6.05	5.90
Sept. 1	13.00	12.37½	38.00	3.87½	3.72½	6.05	5.90

Copper prices are without change in an almost stagnant market. Buying of tin has been fitful and quotations have continued to decline. Lead has been quiet at unchanged prices. Spelter has been held up by foreign demand. Antimony is dull at lower prices.

New York

Copper.—The moderate business which was being done a week ago tapered off and to-day there is practically nothing doing again and the market is on the verge of becoming stagnant. A few sellers are trying to obtain higher prices but there are enough who will let go of electrolytic at 12.37½c., cash, New York, to keep the market at that level. Some producers are reported to have withdrawn prices which may have been to create a stronger tone, or possibly because of the futility of trying to sell when there are no buyers. Prime Lake is firmly held at 13c., despite the fact that some business might be done at ⅛c. less. The exports for August were good considering conditions, 15,846 tons having been shipped, principally to England, against old contracts. New buying in behalf of foreign consumers has been quiet. The base price of hot-rolled sheet copper was reduced on August 18 to 18c., a reduction of ½c. Base prices of various brass and copper products have also been reduced in various degrees, effective September 1.

Copper Averages.—The Waterbury average for the month of August was 13c. The average New York price for Lake, based on daily quotations in *The Iron Age*, was 12.86c., and for electrolytic, 12.39c.

Tin.—The market on August 26 was dull with sellers trying to obtain 40c., but sales of a few five-ton lots were made at less, while tin ex steamers to arrive shortly was sold at ½c. to ¾c. under the spot price. On August 27 there was some desire to sell and metal ex the Minnetonka, due to arrive September 8, was offered at 38c. and September tin at 37.25c. The desire to sell was based on a belief that the Minnetonka might have aboard more tin than had been reported, but the quantity proved to be 400 tons. The stand taken by sellers seemed to frighten off the buyers and they did not take hold to any great extent. Early arrivals sold that day at 38c. On August 28 and 29 there was but little done. The figures of the Metal Exchange, which came out August 31, showing that domestic deliveries in August had been 2900 tons while there was stock on hand of 1077 tons, were a surprise and a disappointment to holders of the metal and the market softened and tin to come from London on the Menominee was offered at 37.50c. and bids at less would have been accepted. Tin ex the Minnehaha, now at her dock, sold on that day at 38c. and some business was done in future positions, but not a great deal. Yesterday the market was listless and uninteresting, although some tin ex the Menominee was sold at 36c. This means, of course, future delivery. The arrivals in August were 2680 tons and there was afloat at the end of the month 1930 tons. An auction sale of Banca tin is due to take place in Amsterdam to-morrow when 2300 tons will be offered. The New York quotation to-day is 38c.

Lead.—While the market has been quiet it has been fairly firm at 3.87½c., New York, and 3.72½c., St. Louis. As to the future course of the domestic market there is considerable difference of opinion, some looking for a stronger market and others for weakness, but there is not likely to be any change of importance until some radical cause turns up. Exports have been fair, but they are offset by the slow domestic demand. The availability of metal from Spain restricts exports.

Spelter.—Demand from England, some of it by way of Canada, has held the market up, though exports have lessened a little. The total amount exported in August was about 2500 tons. Domestic demand is quiet. As a result of the higher prices, makers of sheet zinc on August 29 advanced the base price in carload lots 25c. per 100 lb. to $7.50 per 100 lb., base, less 8 per cent. discount, f.o.b. cars Peru, Ill., with extras and discounts unchanged. On August 21 the same makers withdrew all quotations, though stating they would be glad to receive inquiries. Spelter to-day is quoted at 6c. to 6.10c., New York, and 5.85c. to 5.95c., St. Louis.

Antimony.—Quotations still vary considerably, but the market is quiet at around 15c. for Cookson's, 14c. to 15c. for Hallett's and 12.50c. to 14c. for Chinese and Hungarian grades.

Old Metals.—The market continues exceedingly quiet. Dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	12.00 to 12.50
Copper, heavy and wire	11.50 to 12.00
Copper, light and bottoms	10.50 to 11.00
Brass, heavy	8.75 to 9.00
Brass, light	6.25 to 6.50
Heavy machine composition	11.75 to 12.00
Clean brass turnings	8.50 to 8.75
Composition turnings	10.00 to 10.25
Lead, heavy	3.60
Lead, tea	3.40
Zinc scrap	4.00

Chicago

AUGUST 31.—There is less of panic in the non-ferrous metal market sentiment. Sufficient shipments of tin are being received to meet current needs and there is a disposition to let the future take care of itself. Copper quotations are largely nominal, with quite a range in quoted prices. Antimony is decidedly easier, particularly for the cheaper brands, and very little interest is being displayed. We quote as follows: Casting copper, 12.62½c. to 12.75c.; Lake copper, 13c. to 13.25c. for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 40c.; small lots, 40c.; lead, desilverized, 3.85c., and corroding, 4.10c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.80c. to 6c.; Cookson's antimony, 15c. to 20c. for cask lots; other grades, 15c. to 20c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11c.; copper bottoms, 9.75c.; copper clips, 10.25c.; red brass, 10.25c.; yellow brass, 7c.; lead pipe, 3.30c.; zinc, 3.50c.; pewter, No. 1, 23c.; tinfoil, 33c.; block tin pipe, 35c.

St. Louis

AUGUST 31.—Conditions in the non-ferrous metal market have been a little more stable, though there is still considerable unevenness. Lead is now quoted at 3.75c.; spelter, 6c.; tin, 45c.; Lake copper, 14.50c.; electrolytic copper, 14.40c. Cookson's antimony, 15c. In the Joplin ore market still greater strength and higher prices are noted, with the basis price for zinc blende

ranging from $49 to $50.50, with the settlements for choicest grades reaching as high as $53 to $53.50 per ton. An increasing tendency is shown to hold ore for still better prices. Calamine is firm at $23 to $24, with choicest grades bringing $29. Lead ore is strong at $46. Miscellaneous scrap metals are quoted as follows: Lead, 3c.; zinc, 3c.; tea lead, 3c.; pewter, 20c.; tinfoil, 35c.; light brass, 5.50c.; heavy yellow brass, 7c.; heavy red brass and light copper, 8.50c.; heavy copper and copper wire, 10c.

Iron and Industrial Stocks

NEW YORK, September 2, 1914.

The New York Stock Exchange is still closed, and therefore quotations on iron and industrial stocks continue unavailable. An occasional private transaction is reported in the financial papers, but the prices thus named are not regarded as authoritative. No intimations are given as to when the important stock exchanges of the country may resume business.

Dividends Declared

The American Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 21.

The LaBelle Iron Works, regular quarterly, 2 per cent. on the preferred stock, payable October 1.

The Moline Plow Company, regular quarterly, 1¾ per cent. on the first preferred and 1½ per cent. on the second preferred stock, both payable September 1.

The Packard Motor Car Company, regular quarterly, 1¾ per cent. on the preferred stock, payable September 15.

Pettibone, Mulliken & Co., regular quarterly, 1¾ per cent. each on the first and second preferred stocks, both payable October 1.

The Railway Steel Spring Company, regular quarterly, 1¾ per cent. on the preferred stock, payable September 21.

The American Can Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 1.

The Continental Can Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 1.

Pittsburgh and Nearby Districts

The plant of the Croxton Motor Car Company, Washington, Pa., has been bought by the Angldile Computing Scale Company, Elkhart, Ind., for the reported price of $52,500. The purchaser will move its own plant from Elkhart to Washington, and will likely be in the market for some equipment to fit it for the manufacture of computing scales.

This week the Ohio works of the Carnegie Steel Company at Youngstown, Ohio, is operating to about 85 per cent. of capacity. Ten of the 12 open-hearth furnaces are running, a larger number than for some time.

The American Vanadium Company, Pittsburgh, states that vanadium steel has been specified for 21 Mikado locomotives for the Southern Pacific Railroad, 20 of which are to be built by the Lima Locomotive Corporation and one by the Baldwin Locomotive Works. Frames, driving axles, main and side rods, piston rods and main crank pins will be of vanadium steel. All the forgings will be heat-treated to give physical properties in conformity with the specifications for vanadium steel forgings recommended at the recent convention of the American Railway Master Mechanics' Association. The driving axles will be hollow bored.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, states that it is operating its black and galvanized sheet mills to practically full capacity. It is now quoting a minimum of 2c. for No. 28 black sheets and 3c. on No. 28 galvanized f.o.b. Youngstown.

The Erie Art Metal Company, Erie, Pa., maker of pressed steel specialties, has increased its capital stock from $20,000 to $60,000. The company states that the increase does not change its working conditions but is merely dividing up the profits, and does not indicate that it will be in need of any new tools at this time.

The Bessemer Motor Truck Company, Grove City, Pa., has increased its capital from $100,000 to $300,000.

The Rail & Roadbed Construction Company, Charleston, W. Va., has been incorporated with an authorized capital of $25,000. The incorporators are W. H. Morris, Dr. M. V. Godbey, W. C. Barger, U. S. Albertson and S. V. Morris. The company will manufacture and deal in street railroad rails.

W. H. Latshaw, Peoples Bank Building, Pittsburgh, is in charge of an office recently opened by the Richardson-Phoenix Company, lubricating engineer and manufacturer.

The bi-monthly settlement of the puddling and finishing scales for mills in Pittsburgh and Youngstown districts will be made in Youngstown, Ohio, on Thursday, September 10. The Youngstown Sheet & Tube Company and the Girard Iron Company do not sign the Amalgamated scales, but pay Amalgamated rates for puddling and finishing.

OBITUARY

RALPH EMERSON, Rockford, Ill., died August 19, aged 86 years. He was founder of the Emerson agricultural-implement interests in Rockford which were merged into the Emerson-Brantingham Company in July, 1912. At the time of his death he was chairman of the board of directors of this company. He was a cousin of Ralph Waldo Emerson and was widely known as a philanthropist as well as a manufacturer. He leaves a widow and five daughters. One of his daughters is the wife of E. P. Lathrop, one of the vice-presidents of the Emerson-Brantingham Company.

JOHN A. RAWLINS, who was thrown from his horse in a polo game August 22 at Meadow Brook, Long Island, died August 27 at the nearby Nassau Hospital, Mineola. He was 44 years old, was born in England, and after some clerical experience in London came to this country, and was a member of the firm of Naylor & Co., until March, 1913. At the time of his death he was vice-president of the American Grondal Company, 45 Wall street, New York.

RUDOLPH J. LOGEMANN, secretary and treasurer of the Logemann Brothers Company, Milwaukee, Wis., dropped dead in his office August 27, while at the telephone. Death was due to heart failure. He was 46 years old, a native of Milwaukee, and a graduate of the college of engineering, University of Wisconsin, class of 1893. He had never been ill. He leaves a widow. Three brothers, Otto, Adolph and Richard, are among the surviving relatives.

THOMAS E. HUGHES, manager at Philadelphia of the Southeastern sales department of the Standard Underground Cable Company, died August 27 in Atlantic City, N. J., aged 64 years. In early life Mr. Hughes became identified with electrical interests and developed into an expert in cable matters. For several terms he was secretary and a director of the Manufacturers' Club. He leaves a widow and two daughters.

JAMES H. VAN DORN, president Van Dorn Iron Works Company and Van Dorn & Dutton Company, Cleveland, Ohio, died suddenly of heat failure August 29, aged 73 years. He was in his usual good health until a few minutes before he was stricken. He was born in York, Ohio, and in 1873 located in Cleveland, where he founded the two companies of which he became president.

GEORGE R. COATES, treasurer of the Hazard, Coates & Bennett Company, iron, steel and metal merchant, Rochester, N. Y., died August 29. He had been connected with the company and its predecessors for the last 35 years.

PERSONAL

Judge E. H. Gary is expected to sail for New York on the steamer France September 5.

H. C. Frick was reported last week to be very ill at his summer home at Pride's Crossing, Mass., but it is now said he has improved and that his illness was not as serious as early reports indicated.

George W. English, treasurer of the Zug Iron & Steel Company, Pittsburgh, has resigned. His successor has not yet been appointed.

Prof. R. Poliakoff, of the Imperial Technical Institute, Moscow, Russia, spent several days in Cincinnati, Ohio, last week, visiting the different machine-tool plants. He stated that he believes American manufacturers will be overrun with business as soon as the war troubles in Europe are settled. He especially called the attention of Cincinnati manufacturers to the large and increasing market in Russia for American machinery of all kinds.

A. H. Whiteside has been made vice-president and general sales manager of the Goulds Mfg. Company, Seneca Falls, N. Y., manufacturer of hand, triplex and centrifugal pumps. He succeeds W. E. Davis, who has been obliged to give up some of his active duties by reason of injuries sustained several months ago. Mr. Whiteside is well known in the machinery and allied trades. His experience in the past 15 years covers connections with the Sterling Boiler Company as Southern manager, with the Westinghouse Electric & Mfg. Company as its Baltimore representative, and with the Allis-Chalmers Company as manager of its power and electric department, in charge of all its pumping engine and centrifugal pump business.

J. M. Morton has resigned as manager of the foundries department of the George F. Shevlin Mfg. Company, Saratoga Springs, N. Y.

W. Scott Matheson, for eight years chief estimator and sales manager of the Seattle Construction & Dry Dock Company, Seattle, Wash., has resigned that connection to become manager of the Westerman Iron Works, in the same city.

F. H. Vaughan is president and general manager of the Louisville Bridge & Iron Company, Louisville, Ky., succeeding J. M. Johnson.

Guy A. Hager, district sales manager of the Lackawanna Steel Company, Buffalo, is spending his vacation in the woods of northern Canada.

A. H. Ingle has taken over the management of the Bridgeford Machine Tool Works, Rochester, N. Y.

W. P. Davis, formerly with the Erdle Perforating Company, Rochester, N. Y., is now with the George W. Brownyard Company, of the same city, in charge of sales.

B. G. Follansbee, president Follansbee Brothers Company, Pittsburgh, maker of sheets and tin plate, has returned from Europe. He was in Germany when the European war broke out.

William G. Mather, Samuel Mather and E. W. Oglebay, Cleveland, Ohio, who have been spending some time in England, arrived in New York August 29 on their way home.

Frank B. Gilbreth, consulting engineer, Providence, R. I., has been conducting a summer school, held for a number of weeks in Providence, of college professors interested in scientific management.

George DeA. Babcock, production manager, H. H. Franklin Mfg. Company, Syracuse, N. Y., is to present a paper on routing and despatching in scientific management before a meeting of the Efficiency Society at Lake Placid, N. Y., September 18.

Howard A. Flagg has become associated with the selling forces of the Standard Welding Company, Cleveland, Ohio. He has been connected with the seamless tubing industry for 15 years, in part with the Shelby Tube Company, the National Tube Company and the Ohio Seamless Tube Company.

H. A. Butz, for the past four years chief engineer of the Dominion Iron & Steel Company, Ltd., Sydney, Nova Scotia, has severed that connection owing to the company discontinuing for an indefinite period all construction work, due to the present war conditions. He was formerly with the Garrett-Cromwell Engineering Company, Cleveland.

Standard Cast Pipe Company's Report

The Standard Cast Iron Pipe & Foundry Company, whose office is at 112 North Broad street, Philadelphia, with works at Bristol, Pa., has issued its annual report for the year ended June 30, 1914. A deficit of $30,-413.76 is shown after all charges. The balance sheet, as of June 30, is as follows:

Assets

Real estate, buildings, machinery, tools and patent rights	$2,842,001.27
Capital stock of Bristol Realty Company	100,000.00
Bills receivable	12,000.00
Accounts receivable	218,664.72
Merchandise on hand	59,176.00
Raw materials on hand	44,803.71
Preferred capital stock in treasury	31,000.00
First mortgage bonds in treasury	237,000.00
Cash on hand	43,034.34
Total	$3,587,680.04

Liabilities

Capital stock issued, preferred	$ 977,000.00
Capital stock issued, common	1,000,000.00
First mortgage 5 per cent. bonds	975,000.00
Bills payable	268,500.00
Accounts payable	219,263.66
Profit and loss	147,916.38
Total	$3,587,680.04

From the accompanying statement of President Joseph S. Keen, Jr., the following extracts are taken:

The business of the past year was far from satisfactory. We had all hoped that by this time there would have been an improvement in the conditions existing in the cast-iron pipe business over last year, but, if anything, the competition is keener and the margin between the price of raw material and the finished product is even less.

During the year the company shipped the largest amount of pipe in its history, namely, 61,086 tons, and we have orders on hand to enable us to run for several months.

After paying all operating expenses and fixed charges and charging to operation the sum of $76,-487.46, which had been expended in maintenance and keeping the works up to its present high state of efficiency, the company showed a deficit for the year of $30,413.76.

There is no question that the company has the best equipped and most economical works in the United States, and the loss is due to two reasons: 1. The very slight margin over the cost of manufacture. 2. Lack of working capital.

If the company had sufficient working capital to have enabled it to go into the market and purchase its pig iron and other materials for cash, we would have saved more than the amount of the year's deficit.

The question is, and it should be properly set before the stockholders, as to what is best to be done in the future. If the securities now in the treasury of the company can be sold it will give ample working capital to run the works to its full capacity, and in this way would reduce the overhead charges which, together with the saving in purchases, would enable the company to operate at a profit even under the present conditions of the trade.

The Glass Brick Company, of which C. B. Lawton will be president, is soon to be incorporated under the laws of West Virginia and will establish a plant at Huntington, W. Va. The enterprise is financed by Cincinnati capital.

The Gowanda Agricultural Works, Gowanda, N. Y., reports that one of its customers for cutlery-making tools has received an order for 35,000 knives for export.

Moving for American Trade Extension

Government Agents to Go to South America at Once—Definite New Trade Opportunities for the United States—Chicago's Vessel Expedition

The United States Steel Corporation makes the statement through President Farrell that it will have ten vessels, which it owns, under American registry by the end of the present week. The proclamation of President Wilson giving the terms under which foreign built ships may fly the American flag, in accordance with the act passed by Congress last week, was expected to be made on Wednesday of this week, as this is written. Vessels of W. R. Grace & Co., the United Fruit Company, the Sun Oil Company and other interests are also expected to come under American registry, so that in a short time the American merchant fleet on the high seas should number 150 to 200 vessels.

Special Government Agents' Work in South America and Other Countries

WASHINGTON, D. C., Sept. 1, 1914.—The question of financing the great opportunities offered by South American markets for the products of our iron and steel and machinery industries is now looming up as the chief problem. In the campaign undertaken by the Department of Commerce and by the Pan-American Union to help American manufacturers in extending their lines into these markets they are now taking occasion to warn prospective exporters against the belief that this can successfully be carried out without considerable capital.

GOVERNMENT ADVICE TO MANUFACTURERS

Thousands of letters are received daily in the offices of the Bureau of Foreign and Domestic Commerce, as well as by the Pan-American Union, from producers who are eager to avail themselves of these opportunities. Because of the governmental positions of the Department of Commerce and the Pan-American Union it has become a delicate matter for either to lay great stress upon the critical financial situation that has been developed in South America. Therefore, all of their replies have had to be couched in most diplomatic language. Their tone, however, has been one of caution against attempts to invade this field in the belief that its prizes can be carried off by merely sending catalogues and expecting cash to accompany orders.

Another problem that is causing some difficulty is the question of shipping. According to reports received by the Department of Commerce, freight rates on some South American lines have been increased heavily since the turn of the commercial tide. Whether these will remain at that point in the face of the prospect of greater competition is not certain. But if they do it is sure to force speedier action on the proposal to establish governmental steamship lines to foreign ports.

FOUR SPECIAL AGENTS TO SOUTH AMERICA

"We are doing everything in our power to help the American manufacturer," said Edwin F. Sweet, acting secretary of the Department of Commerce, in the absence of Secretary Redfield. "The department has been fortunately situated in that it has planned a big campaign for the extension of our South American trade even before there were rumors of European war. This campaign can now be made doubly effective. Under the appropriation of $100,000 given us by Congress to send abroad commercial attaches we hope to send four to South America within a few weeks. The necessary examinations have been held and the papers are now being gone over. We hope to select the men for this work as quickly as possible and to start them to their posts. According to the present plan they will be situated at Rio de Janeiro, Buenos Aires, Valparaiso and Lima. We have not yet decided whether the fact that the war will keep such attaches out of Europe should result in increasing the South American staff. In addition to this, we will strengthen our staff of commercial agents in South America. These men represent various specified lines of industry and have the entire continent as their field. They will go from place to place studying conditions and opportunities, making reports from time to time. The attaches will be limited to the respective countries to which they are accredited. Besides this, the consuls in South America are making most exhaustive reports on the possibilities in their districts.

HELPING DETROIT'S AUTOMOBILE INDUSTRY

"We are also doing all we can to help the manufacturers at this end of the line. For instance, at the request of the Detroit Chamber of Commerce, we sent to that city James A. Reed, formerly connected with the Pan-American Union. Mr. Reed in particular has been helping the automobile manufacturers and other exporters in Detroit to dispose of that portion of their product which has been left on their hands because of the closing up of the European field. Mr. Reed is visiting other points, and we are willing to help out other organizations in the same way whenever we find that such a plan will be of real service. In addition to this, we have four regular representatives of the department at New York, Chicago, San Francisco and New Orleans, whose duty it is to keep in close touch with the various organizations and to help them in every way. Everything depends upon co-operation in a matter like this, and the Government stands ready to do its share.

"One thing all manufacturers who want to go into South America must remember, and this cannot be too strongly emphasized: The financial situation which they must meet will be far different from that to which they have been accustomed in the United States. They must be ready to carry their customers for a considerable length of time. This means capital. One great New York bank is already entering the South American field, but I do not know how far it will be willing to finance such transactions, nor do I know whether other bankers will be ready to take up this work.

"Another thing which manufacturers must keep in mind is the fact that if they depend upon the agents in South America who have been representing European firms they may find when the war is over that these agents will be ready to turn the business back to their European principals. A firm that really wants to establish itself in the South American field should send its own men."

LINES IN WHICH SPECIAL AGENTS WILL WORK

A. H. Baldwin, chief of the Bureau of Foreign and Domestic Commerce, has announced that among the first special agents to be sent into the South American field will be S. S. Brill, of St. Louis, who is making a special tour to study the hardware opportunities there. He is to leave within a week and will begin his observations in Brazil. R. E. Simmons, detailed from the

Forest Service, will investigate markets for lumber products of all kinds, and B. Joachim will cover markets for merchandise such as hats and clothing. An expert on lumber products starts at an early date for Oriental countries, India and Australia, to carry on the sort of work that Mr. Simmons will specialize in throughout Latin America. Ralph M. Odell will also go to the Orient to develop markets for cotton goods.

"The machinery men," said Mr. Baldwin, "are very anxious to have us send a man to study their field, and we shall do so if possible. We are doing all we can to see that the various industries are represented, because of the great importance this trade has suddenly assumed. Even before the war came Congress appropriated, besides the $100,000 for commercial attaches, a special $50,000 for South American work. We are going to use this to the best possible effect."

At the Pan-American Union the clerical staff has been overwhelmed by the avalanche of letters that resulted from its recent invitation to American manufacturers. Every possible industry seems represented in this vast correspondence by those who want the help of the Union to get into the South American markets.

New Business Opportunities for the United States

The statement is made that a northern Ohio concern has cancelled $16,000 worth of German gear hobbing and screw making machinery because of lack of assurance as to deliveries and orders for this equipment will now be placed in this country.

The Teknisk Compani, Christiania, Norway, is seeking to do business with companies in the United States in electrical and other machinery lines. The Norwegian American line and the Scandinavian American line steamers give regular connection between New York and Christiania. The same company is in the market for a quantity of copper wire.

The L. S. Starrett Company, Athol, Mass., maker of mechanics tools, writes as follows, and in general expresses the belief of many New England manufacturers: "Business in this country is very dull at present, but we see no reason why it should not soon revive in a marked degree. The European war will not only stimulate manufacturing in this country through orders received from South America, Australia, South Africa and other foreign countries which are no longer able to get goods from Europe, but also from the demand of our own people for goods which have formerly been bought in Germany, France and other countries. We cannot understand why business is now so dull in this country. We are getting new business from Australia, and business from South Africa and South America is about normal. It would be good in South America if financial conditions in the principal countries there were not unfavorable. We have had orders from Mexico for weeks which were being held, waiting for a chance to get the goods through. Some of these orders have now been released and the goods are on the way. We have the greatest confidence that the business of the United States has the greatest opportunity for expansion in its history. We believe that if we do not get the commercial supremacy of the world within the next year or two it will be simply because we fail to reach out and take it."

One instance of aggressiveness is the action of the Simonds Mfg. Company, Fitchburg, Mass., manufacturer of saws, knives, files and steel which has sent a traveling man from Manila to South America to see what exists there in the way of new business.

The Excelsior Needle Company, Torrington, Conn., writes, "The European war has brought us some business chiefly from customers who are apprehensive that the increased business that may come to us on account of the war will prevent their orders from being filled. We are not receiving export orders to a greater extent than usual, though we are receiving some orders for needles used in this country and hitherto imported."

The Department of Agriculture at Washington has asked Congress to make an appropriation for the immediate construction of an experimental plant on Puget Sound, preferably near Seattle, to demonstrate the commercial possibilities of manufacturing potash from kelp. The Bureau of Soils, which has just concluded an exhaustive study of the kelp beds of the Pacific, from Mexico to Alaska, in a report strongly urges the development of the industry and asserts that a product can be turned out in commercial quantities in from four to six months. In view of the sudden cutting off of the supply of potash from Germany, the department will try to establish factories. The annual importation from Germany, according to official figures, amounts to 900,000 tons, valued at $13,000,000, used chiefly as fertilizer. In the annual report of the American Agricultural Chemical Company, just issued, Thomas A. Doe, the treasurer, says that the company in the past year has acquired from the Spanish Government large concessions in a territory in which important discoveries of potash have been made. These properties are now being surveyed preparatory to boring them for potash. The deposits appear to be similar to those of Germany and it therefore appears that Germany's potash monopoly may be broken and the American Agricultural Chemical Company be in a position to obtain its potash from Spain in the near future.

The Swedish Chamber of Commerce of New York has an inquiry from Sweden for tin-plated steel wire of 0.235 mm. diameter. Swedish manufacturers of electrical and other machinery have asked the above organization for names of New York importers, desiring to sell in the United States product for which there is now little market in Europe.

A Chicago Vessel Expedition to South America

CHICAGO, ILL., September 1, 1914.—The Illinois Manufacturers' Association and the foreign trade committee of the Chicago Association of Commerce are continuing vigorously their efforts to formulate plans and establish channels for the resumption and expansion of South American trade. The Illinois Manufacturers' Association in response to a proposal from New Orleans has invited participation by Chicago manufacturers in fitting out a ship for a working sample expedition to South America. The association has received assurance from the Government that two 10,000-ton ships are available and that the Government will lend its support if the local interests evince a substantial willingness to go through with the plan. The Association of Commerce through its foreign trade committee held another meeting on Monday, at which specific plans were discussed. The effort is being made to work along lines that will be permanent and with plans that will take into consideration the entire problem of financial and trade relations as it has been worked out by European countries in their cultivation of the same trade. A discouraging feature is the fact that many manufacturers have assumed so pessimistic an attitude, because of the curtailment already effected in their business as the result of the war, that they lack the enthusiasm to venture upon pioneering expeditions at this time, particularly where the matter of credits is such an important consideration. Equally important with the European war as an influence upon South American trade from the standpoint of Chicago are the records of recent vessel passages through the Panama Canal. The shortening of time of delivery of goods in transit between our ports and the South American coast is exceedingly impressive, and for Chicago the west coast of South America now becomes an easily accessible market. The importations of the west coast countries harmonize strikingly with what the Mississippi valley has to sell. Peru and Chile will use nearly $20,000,000 worth of coal annually. In one year Chile used corrugated sheets to the amount of $2,000,000. Her imports of steel rails were nearly as much. That market will also take in pipes and tubes approaching $3,000,000 in value each year. Steel bars, wire rods, rail fastenings, mining machinery, agricultural implements and power equipment, for which there is a market on the west coast of South America, will aggregate close to $10,000,000 and should steadily increase.

Steel Corporation Waiting for Ship Registry Proclamation

President James A. Farrell of the United States Steel Corporation sent the following telegram to Representative Mann and it was read in the House of Representatives on August 26:

"Our steamer Bartu, loaded for Uruguay and Argentina, and steamer Crofton Hall, loaded for Chile and Peru, in New York Harbor ready to sail. Steamer Kentra ready for grain or cotton Atlantic Coast or Gulf. Steamer Santa Rosalia, Puget Sound, ready for wheat. Steamers San Francisco, Buena Ventura, Ikaria, Industry, Matoppo and several others available for transporting American products.

"We are patiently awaiting issuance of proclamation in order to be in an intelligent position as to whether we can put these steamers under American flag immediately and operate them competitively with steamers in oversea trade under other flags. As our steamers are being held in various ports at very heavy expense, would appreciate advices as to about when information will be available to enable us to determine what to do. Captain Dollar and other American owners of ships now under foreign flags are in same position.

"The provisions of law prescribing that the watch officers of vessels of the United States shall be American citizens should be suspended for a period of at least three years, and the provisions of law requiring survey, inspection and measurement by officers of the United States should also be suspended for the same period. Further, until the war risk insurance bill has passed the House and becomes effective, we would be without insurance in the event of a transfer."

Thus far President Wilson has not made public the conditions of American registry for foreign built vessels. On August 29 the House passed the war risk insurance bill with amendments. The bill for a Government controlled corporation to establish an American merchant marine will follow the war risk bill in the House. Thus far the bill has found little favor outside of Washington.

Wisconsin Manufacturers Ask Special Action in Behalf of Imports

MILWAUKEE, WIS., August 29, 1914.—Twenty-five of the leading manufacturers of Wisconsin, representing more than 100 lines of industry, met at Milwaukee on August 27 to discuss ways and means of establishing trade with South America and Central America to compensate for the reduction of trade with European countries involved in war. A committee on foreign relations was appointed and the following memorial to Congress was adopted:

The manufacturers of Wisconsin earnestly petition the Congress of the United States to take such steps as may authorize the chief executive of the nation and the Department of State to enter into negotiations with foreign powers through which the importation of chemicals and other materials from countries now involved in war, which are not obtainable elsewhere and which are absolutely necessary to many American industries, may be effected.

It is our belief that the industries of the United States should not be hindered for the want of materials which are essential to manufacturing operations and which through diplomatic negotiations may be permitted to be imported to this country.

We further believe that the protection and promotion of American industries is particularly vital at this time when the country is still in the midst of a period of business depression with no immediate promise of a general revival.

The foregoing petition is submitted for your early and earnest consideration.

Among representatives of the metal trades who attended the conference were E. J. Kearney, of Kearney & Trecker Company; Gen. Otto H. Falk, president Allis-Chalmers Mfg. Company; E. C. Bayerlein, Nordberg Mfg. Company; Charles H. Van Kirk, Twentieth Century Machinery Company; T. R. Brice, L. J. Mueller Furnace Company; C. R. Falk, Falk Company; H. Harnischfeger, Pawling & Harnischfeger Company; Arthur Davidson, Harley-Davidson Motor Company; Oscar Stegeman, Stegeman Motor Car Company; G. M. Matson, John Lauson Mfg. Company of New Holstein, Wis.; H. W. Bolens, Gilson Mfg. Company, Port Washington, Wis.

Cleveland Manufacturers and Export Trade

Steps are about to be taken by the Chamber of Commerce of Cleveland, Ohio, to assist the local manufacturers in developing foreign trade, particularly in South America. A few months ago a sub-committee of the export committee of the chamber was appointed to make a thorough investigation of the subject of foreign trade. This movement originated through the new interest taken in the South American field because of the building of the Panama Canal. The sub-committee was well along with its investigation when the European war broke out and it hastened the completion of its work because of the great interest that is now being taken in foreign markets by American manufacturers that has been developed by the new conditions growing out of the war. The sub-committee made its report to the general committee on August 31 and recommended the establishment of a foreign trade department in the chamber as an aid to Cleveland manufacturers in developing foreign trade. No definite action can be taken until the committee's recommendations are approved by the chamber through its board of directors, but early and favorable action is expected by the directors. The committee, in interviewing Cleveland manufacturers, found that many who had formerly been only lukewarm as to South American trade are now taking a very lively interest in the subject, the change in sentiment having been brought out by the opportunities offered to American manufacturers to develop a trade in foreign fields that heretofore has been largely monopolized by England and Germany.

Westinghouse Electric & Mfg. Company Changes

At a meeting of the board of directors of the Westinghouse Electric & Mfg. Company held in New York Wednesday, August 26, Henry D. Shute was elected treasurer to succeed T. W. Siemon, who recently resigned to accept the position of secretary-treasurer of the Union Switch & Signal Company, Swissvale, Pa. Truman P. Gaylord, district manager of the Westinghouse Electric & Mfg. Company at Chicago, was elected acting vice-president to succeed Mr. Shute. Graduating from the Massachusetts Institute of Technology in 1892, Mr. Shute entered the works of the Westinghouse Electric & Mfg. Company at Pittsburgh in 1893 as an apprentice. In 1901 he was appointed head of the alternating-current division. Two years later he was promoted to the position of assistant to Vice-President L. A. Osborne, and was particularly active in the development of heavy electric traction and single-phase railroad work. In 1910 he succeeded Walter McFarland as acting vice-president of the company. T. P. Gaylord, who succeeds Mr. Shute, received the degree of electrical engineer from the Armour Institute of Technology, Chicago, in 1895. He was an engineer of underground construction during the World's Fair at Chicago and later was assistant professor of electrical engineering in the Armour Institute. In 1898 he became associated with the Commonwealth Edison Company of Chicago as electrical engineer. In 1899 he entered the employ of the Westinghouse Electric & Mfg. Company as a salesman, and in 1902 was appointed district manager of the company in Chicago.

The railroads affected by the reduction in freight rates on pig iron from Virginia furnaces to Baltimore, Philadelphia, New York, Boston and other points in New England and the Middle Atlantic States having failed to file the new rates, based on $2.25 to Baltimore, $2.75 to Philadelphia, $3 to New York and $3.25 to Boston, the Interstate Commerce Commission entered an order on August 31 requiring that the new tariffs be filed and be made effective October 15.

Refrigerated Drinking Water Systems

The various questions to be taken into consideration in the installation of factory drinking water systems have been studied by the Armstrong Cork & Insulation Company, Pittsburgh, Pa. The data have been secured through observation of installations and from a series of tests carried out in the company's testing station at its plant at Beaver Falls, Pa.

The amount of water which must be allowed for each operative varies in different industries and also according to climatic conditions. In steel plants, where the working conditions are severe, from 0.23 to 0.3 gal. per hr. is required for each man, this figure including waste. In other industries, where the demands on the physical strength of the employees are not so great and in factories employing female labor, the amount required is somewhat less. Provision must, of course, be made in designing the system to take care of the requirements in the hottest weather and for that reason an allowance of 0.25 gal. per hr. for each operative, including waste, should be taken as a basis.

The character of the plant, the grouping of the working force, the location of the power house, etc., all exert influences on the arrangement of the pipe line circuits. A supply main with two or more short branch circuits rather than a single one of great length is preferred. While successful installations can be made with circuits as long as 5000 ft., a length of from 1500 to 2000 ft., if possible, is recommended. A 1-in. pipe is generally used, but where it is necessary to provide for a considerable number of men on a single circuit, larger lines are used.

The preferred temperature for water for drinking purposes is 45 to 50 deg. F., and for that reason the water should leave the cooling tank at the lower temperature and the system designed to provide for a temperature rise of not over 5 deg. In this way economy in operation will be secured and the water will be delivered in approximately the same temperature at all points in the plants.

The question of the maximum permissible velocity is one that is open to considerable debate. Extended observations on the part of the company of installations in regular operation would indicate 190 ft. per min. as the maximum rate of flow for securing the best results. Even though the water may be carefully filtered, in time a slight amount of sediment may appear which would be stirred up by the higher velocity and thus the water would have a turbid appearance. This condition can, of course, be avoided by designing the system to obviate the necessity for high velocities.

The amount of refrigeration will depend on the size of the installation, the length of the distributing lines, the outside temperature and that at which it is desired to maintain the water, the length of the working day and the manner in which the lines are insulated. The figure given in the pamphlet varies from 0.00027 to 0.0005 ton of refrigeration per hr. per man.

Each installation will have a separate arrangement of apparatus. In general the water from the supply main will pass through a suitable filter, unless the water is chemically pure and free from bacteria. From the filter the water flows into the cooling tank where a constant level is maintained by a float valve. Here the refrigerating machine cools the water, which is then forced by a small pump through the distributing lines. At the return end of each circuit a thermometer is inserted in the pipe together with a gate valve, so that the flow of water can be regulated to secure an even temperature in every circuit. Galvanized pipe is recommended for the distributing lines with long sweep fittings to reduce friction to a minimum. Overhead location is to be preferred, as it provides a more flexible system, any leaks can be readily detected and the cost of upkeep is reduced, as the insulation on the pipe is preserved in better condition. The circuit should in all cases be carried past the drinking fountains, so that the water will run cold as soon as the valve is opened. The drinking fountain can be of any desired type. An inexpensive one consists of a 3½-in. steel pipe with a white-enameled bell holding the nozzle, which is set so low that the lips cannot touch it. The waste water flows down through the inside of the 3½-in. pipe to the sewer. In locating the fountains care should be taken to have them accessible to the workmen, but not near dangerous machinery.

The insulation of the cooling tank and distributing lines is the vital factor in the success of a circulating drinking water system. If they are not suitably protected from heat the temperature of the water will rise rapidly, an undue amount of refrigeration will be required and moisture will collect on the outside of the lines, thus causing the covering to disintegrate and the pipe to rust out rapidly.

An example of the savings afforded by the installation of the drinking water system is that of the Pennsylvania Works, National Tube Company, Pittsburgh, Pa. Formerly drinking water was furnished to 1000 men at an annual cost of $5000. A refrigerated drinking water system was installed at a total expense of less than $9000 with the result that the total operating cost when the mill is working full time, including the water, is about $1.82 per employee per year, against approximately $5 per man by the old method. In addition to the saving, a material benefit was derived through the increased efficiency and satisfaction of the employees and reduction in the amount of time lost from productive work.

Indicating Proper Wrench Sizes for Nuts

A system of stamping semi-finished and finished drop forged wrenches has been developed by the Billings & Spencer Company, Hartford, Conn., to indicate clearly the purpose for which the wrench is to be used. The object of this arrangement is to eliminate as far as possible any delay in filling orders for wrenches on account of incorrect information as to the work the wrench is to do. This consists of stamping a numeral followed by a hexagon and the letter C, a square and the same letter and by the letters U. S. S. In this way it is possible to tell at a glance the various sizes of set screws and nuts and bolts that the wrench can be used for.

Nuts are designated by the size of the tapped hole or the size of the bolt on which they are used, while bolts and cap screws are designated by the size of the diameter of the body or shank of the screw. If, for example, the opening of the wrench is ⅞ in. the head is stamped ⅞ followed by a hexagon and the letter C, ¾ followed by a square and the letter C, and ½ U. S. S. This indicates that the wrench can be used for the ⅞-in. hexagon cap screw or ¾-in. square cap screw or a ½-in. U. S. Standard nut or bolt. For the smaller sizes of wrenches, which are intended to be used with set screws, the size of the set screw is stamped on the wrench followed by the word "set," in addition to the markings indicating the sizes of the hexagon and square cap screws. These markings are stamped on the wrench near the opening. The semi-finished wrenches are milled to fit the nut or screw on which they are to be used and case hardened all over, while the finished wrenches are milled to fit the nut or screw and are ground, polished, case hardened all over and lacquered with the ends bright.

The Tungsten Market and the War

Inquiry as to the effect of the war on the tungsten situation discloses the fact that all shipments of both the pure metal and of ferrotungsten from Germany are entirely cut off, that country being an important source of supply. It is believed, however, that domestic producers can furnish enough of either product to take care of a normal demand, the tungsten ores in Colorado being plentiful. It is, of course, probable that the price will be decidedly advanced, which is likely to be the only important effect of present conditions. The price of tungsten in this country before the war was 67c. to 72c. per lb. There have been no transactions in recent weeks. In the English market the price in July was 3s. (75c.), whereas recently 4s. 6d. to 5s. ($1.09 to $1.22) is the quoted range.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

RIGHT TO DISCHARGE TRAVELING SALESMAN.—Where a traveling salesman was under contract for one year, and on receiving a letter severely criticising him for making a price concession to a customer, and he wrote a letter offering to resign, but the offer was not accepted and he performed further service for his house, the employer could not afterward base a discharge on this offer. (Nebraska Supreme Court, Nesbit vs. Giblin, 148 Northwestern Reporter 138.)

SALESMAN'S RIGHT TO COMMISSION.—A manufacturer is liable for commissions agreed to be paid a traveling salesman on orders obtained by him, although, through shortage of stock, the manufacturer is unable to fill the orders, if they were taken in good faith and without any violation of the salesman's instructions. (St. Louis Court of Appeals, Paul E. Wolff Shirt Company vs. Sacks, 168 Southwestern Reporter 641.)

CONSPIRACIES BY WORKMEN TO SECURE DISCHARGE OF ANOTHER.—Although workmen in a plant may lawfully combine to procure the discharge of an employee whose habits, character or conduct toward them while at work renders him unfit for association with workmen of good character, they are liable in damages for combining in procuring discharge of an employee who has given no just ground for offense, by threatening to strike in the event that he should not be discharged. (Pennsylvania Supreme Court, Bausbach vs. Reiff, 91 Atlantic Reporter 224.)

NO SUBROGATION UNDER WORKMEN'S COMPENSATION ACT.—When an employer is compelled to pay an award under the New Jersey workmen's compensation act for injury to, or death of, an employee in the course of his employment, due to the negligence of an outsider, the employer has no right to enforce a claim against such outsider for reimbursement. (New Jersey Supreme Court, Newark Paving Company vs. Klotz, 91 Atlantic Reporter 91.)

SELLER OF SECOND HAND MACHINERY DOES NOT IMPLIEDLY WARRANT IT.—A sale of second hand machinery does not imply a warranty on the part of the seller that it is reasonably well adapted to the use for which it was manufactured. (Alabama Supreme Court, Johnson vs. Carden, 65 Southern Reporter 813.)

IDEAS WHICH ARE NOT PATENTABLE.—Adjustability of parts of a device cannot be made the basis of patentable invention. (United States District Court for the Northern District of Ohio, Positive Lock Washer Company vs. Reliance Mfg. Company, 214 Federal Reporter 134.) Nor can invention be based upon the mere fact that a certain process utilizes less material than has been used by a prior similar process. (United States Circuit Court of Appeals, Ninth Circuit, Hyde vs. Minerals Separation, 214 Federal Reporter 100.)

RIGHT TO ENJOIN BREACH OF CONTRACT.—When a manufacturer breaks a contract binding him to buy his fuel from a certain concern during a certain period, the legal remedy of the latter is limited to a claim for damages sustained in consequence of the breach; the concern cannot maintain a suit to enjoin the manufacturer from further breaking the contract. (West Virginia Supreme Court of Appeals, United Fuel Gas Company vs. West Virginia Paving & Pressed Brick Company, 82 Southeastern Reporter 329.)

CARRIER'S LIABILITY FOR LOSS OF GOODS.—The initials "S. L. & C." are not the equivalent of the words "shipper's load and count," within the meaning of the following section of the New York laws: "The carrier may, also, by inserting in the bill of lading the words 'shipper's load and count' or other words of like purport, indicate that the goods were loaded by the shipper and the description of them made by him; and if such statement be true, the carrier shall not be liable for damages caused by the improper loading or by the non-receipt or by the misdescription of the goods described in the bill." But, if a course of dealing is "shown between the parties where such initials had been used to the knowledge of both parties as indicating such meaning, a different question might arise." (New York Supreme Court, Appellate Division, Fenderson vs. New York Central & Hudson River Railroad Company, 148 New York Supplement 494.)

PROOF OF NEGLIGENCE ON EMPLOYER'S PART.—In a suit to recover damages for death of an iron company's employee, which resulted from overturning of a derrick car while it was being moved under his charge on a narrow gauge track, through swinging of the boom, which it was his duty to see was kept in proper position while the car was being moved, there cannot be recovery in the absence of proof that the accident was directly caused by the existence of a defect in the appliances. (New York Supreme Court, Appellate Division, Lamour vs. Northern Iron Company, 148 New York Supplement 458.)

INJURY RECEIVED IN OPERATING STEAM HAMMER.—Recovery for death of an employee while engaged in operating a steam hammer, due to breaking of a cutter under a blow of the hammer, will not be sustained on the theory that the machine was defective, where the evidence concerning the cause of the accident has a much stronger tendency to sustain a finding that the breaking of the cutter was due to the manner in which the workman held it. (New York Supreme Court, Appellate Division, Cherney vs. Ludlum Steel & Spring Company, 148 New York Supplement 463.)

AUTHORITY OF EMPLOYEE TO PURCHASE MACHINERY.—A manufacturing company will be held liable for the price of a machine purchased by its employee, although he may not have been expressly authorized to make the purchase, if, after being advised thereof, the president and general superintendent made no objection, and continued to receive daily reports concerning its operation. (Texas Court of Civil Appeals, Benford Lumber Mfg. Co. vs. Knox, 168 Southwestern Reporter 32.)

DAMAGES RECOVERABLE FOR DELAY IN DELIVERING MACHINERY.—A buyer of machinery cannot recover, as an element of damage for the seller's failure to make prompt delivery, loss for rent paid on the factory building in which the machinery was to be used, or for wages paid employees while awaiting delivery during the delay, without showing that such damage was within the contemplation of the parties at the time the contract of sale was made. (Texas Court of Civil Appeals, Pickering Mfg. Company vs. Gordon, 168 Southwestern Reporter 14.)

PASSING OF TITLE UNDER SALE.—Delivery of a thing sold, at the place and in the manner agreed upon, passes title to the buyer, so as to place upon him any subsequent risk in transportation. The buyer has a reasonable time after the delivery in which to examine the goods, and, if they are not of the kind and quality ordered, he may then refuse to accept them, but this right does not prevent the title from passing, nor a recovery of the price by the seller, if the goods do in fact conform to the contract. (Washington Supreme Court, Skinner vs. James Griffiths & Sons, 141 Pacific Reporter 693.)

SAFETY OF PLACE OF WORK IN FOUNDRY.—In a suit against a foundry company for injury to an iron molder, scalded by molten iron on stumbling while carrying it in a ladle, the company may be found to have been negligent in failing to have constructed a substantial pathway for use of employees in carrying molten metal, instead of providing a pathway constructed of easily displaced molding sand. And if the accident is directly attributable to such negligent failure to provide a reasonably safe place of work, the company is liable for the damages sustained by the injured employee. (New York Supreme Court, Appellate Division, Dzubak vs. West Side Foundry Company, 148 New York Supplement 403.)

DUTY TO CUSTOMERS ON PREMISES.—When a customer or other person is being shown through dimly lighted premises, there is a legal duty to warn him against the danger of falling into an unguarded stairway or other opening, the existence of which is not obvious. (New York Supreme Court, Cheifetz vs. Hills, 148 New York Supplement 103.)

The Machinery Markets

Business is light in all sections of the country, but progress is slowly being made toward the readjustment which the European war has made necessary. In the chief industrial cities efforts looking to the extension of our foreign trade are being organized, most of the attention being centered on South America. This is work, however, which must prceed slowly, it is conceded by those who have had extended experience in foreign trade. In New York what opportunities there might be for business with South America and Mexico are hindered by the high rates of foreign exchange. Autumn buying is expected to start shortly in New England as stocks everywhere are small and there must be replenishment eventually. In Detroit, where competition is keen, manufacturers are showing great interest in the development of foreign markets. Several foreign inquiries have been received in Cleveland and a heavy demand is expected to come later. Cincinnati also has received some good export orders, notably from Italy and England, and there is a better sentiment generally, though jobbing foundries are complaining of the light demand upon them. Milwaukee is feeling the falling off in plant extensions, but is planning organized effort to get South American business. Although the domestic demand appears to have decreased in Chicago, inquiries of various kinds which are being received give promise of a much livelier foreign trade. The Central South gives promise of better business, but much depends on the disposition of the cotton crop. In Birmingham also, realizing on the cotton crop is a decisive factor. The market is slowly improving in St. Louis, but in this city also much depends on the successful financing of the cotton yield. Texas is reviving from the shock of the big war and inquiries are commencing to come from Mexico. Conditions in the Pacific Northwest are more favorable; shipping on the Pacific is freer, but the problem of high foreign exchange still remains.

New York

NEW YORK, September 2, 1914.

Business in this territory is extremely light. It was bad enough up to the outbreak of the European war, but since then it has become worse and the hopes of the trade are bolstered up alone by what the fall may bring. That some manufacturers have faith in the near future is shown by the fact that they are stocking up. Some are expecting to do business in new fields abroad, but so far efforts in that direction have been disappointing. A canvass of export purchasing agents disclosed the fact that most of them found business in behalf of their principals made unusually difficult because of the high rate of foreign exchange between this country and Mexico and South America. Railroad buying seems to be at an absolute standstill, while another adverse circumstance which salesmen have found is the lessened production of manufacturing plants. Short working days and few of them are common.

One of the bright spots in the situation is the increased activity and plans for still greater activity of the companies which make ball and roller bearings. Most of the ball bearings of a high grade have heretofore been imported, but plans are under way for making the entire supply here. The Hess-Bright Mfg. Company, Philadelphia, has recently purchased over $200,000 worth of machinery which it will install in its present plant and it has plans under way for a new building, 200 x 300 ft., one story, saw-tooth construction in the rear and a three-story building in front for which equipment will have to be purchased. When the plans are consummated the company will be independent of imports and, it is hoped, in a position to withstand the attacks of foreign competition when it comes. The Hyatt Roller Bearing Company, Harrison, N. J., has also of late been a purchaser of machine tools.

The engine room of the Rome Metal Company, Rome, N. Y., was badly wrecked by fire last week with an aggregate damage amounting to about $75,000. Repairs and renewals will be made at once.

Sealed proposals for new boilers for the Potsdam Normal School, Potsdam, N. Y., are being received by Thomas E. Finegan, assistant commissioner for elementary education, Educational Building, Albany, until 12 noon, Sept. 5. Plans and specifications will be furnished by Lewis F. Pilcher, State Architect, Albany.

The Highlander Machine Company, Rochester, N. Y., has been incorporated with a capitalization of $20,000 by Roy O. Benedict, Osburn Gurney and H. R. Hopcraft.

The Shredded Wheat Biscuit Company, Niagara Falls, N. Y., has had plans completed for a steel and glass mill to be erected at Oakland, Cal., to cost $150,000.

The Gabrielson Car Parts Mfg. Company, Jamestown, N. Y., has been incorporated by John Gabrielson, O. A. Lenna and G. A. Lawson with a capital stock of $35,000. Plans are being completed for the erection and equipment of a factory.

The Lunan Porcelain Metalware Company, Buffalo, recently incorporated with a capital stock of $20,000, will build a plant at Northumberland and Cornwall avenues and the Erie Railroad for the manufacture of enameled metalware household utensils, etc. The first building to be erected will be 85 x 105 ft., brick and concrete, with necessary bake ovens. William C. Lunan, 545 Crescent avenue, is president. Capital stock, $20,000.

The F. J. Poehlman Mfg. Company, Syracuse, N. Y., has been incorporated with a capital stock of $50,000. Frederick J. Poehlman, George F. Sax and Patrick F. Ryan are the directors.

Construction work has been commenced on the new plant of the Continental Heater Company, Dunkirk, N. Y., located at Otto street and the Lake Shore Railroad. The main building will be 400 ft. long, of steel, brick and concrete, one story, with a floor space of 35,000 sq. ft., and will be in readiness for operation February 1 next. A large amount of machinery and equipment will be installed. Earl C. Reed, former secretary of the United States Radiator Corporation, will be the manager of the company.

The Locke Insulator Mfg. Company, Victor, N. Y., has increased its capital stock from $600,000 to $800,000.

The Mohawk Valley Mfg. Company, Oneida, N. Y., will erect a factory building, 45 x 90 ft., one story, of concrete construction, for the manufacture of carriage hardware, etc.

The J. Lawrence Hill Company, Rochester, N. Y., capitalized at $10,000 has been incorporated to manufacture auto storage batteries by J. Lawrence Hill, J. Hill and J. Jaffray.

The Taber Pump Company, Buffalo, N. Y., states that it has not fully decided upon its machinery requirements for its new factory, but they will probably include electrically-driven lathes, drill press, planers and shaper. The cost of the new factory will be about $75,000. M. E. Taber is secretary.

The Northern Ore Company's surface plant at Edwards, St. Lawrence County, N. Y., was recently destroyed by fire. The company is preparing to rebuild and will use fireproof construction throughout.

The Eastern Lamp Company, 227 Gaskill street, Philadelphia, plans the erection of a factory, 42 x 122 ft., one story, of brick construction, to be erected on Bartum avenue, near Eighty-fourth street, Philadelphia, and to be completed by December 31 next. F. N. Greisler is the architect. H. Bleshman is in charge.

New England

BOSTON, MASS., September 1, 1914.

The process of readjustment of business to the new conditions is proceeding consistently. Though in many cases current production has been hit by the loss of European business, most manufacturers are optimistic. Bugaboos are being killed off one after another. In New England the most talked of obstruction to good business is the lack of German dyestuffs, but looking a little ahead it is not difficult to see a plentiful supply of these materials produced in American works. Perhaps certain colors will be lacking for a time,

but this would merely mean a change of fashions, which fact in itself would result in large demand for new American goods. Everyone is studying the new fields which will have to be taken care of by American manufacturers, and presently the problems will be solved and a machine built up for covering and supplying the new markets. The machine-tool people will feel the new impetus, directly in a moderate degree, and in a large way indirectly as their customers feel the need of increased manufacturing facilities.

The next few weeks will see an improvement in business because of seasonable buying, unless this autumn is the exception to all preceding years. It has been lost sight of in many cases, in considering the present dull business, that August is almost invariably a time of slackening in buying and production. Also, too great emphasis cannot be laid on the fact that the country is short of stocks. Retailers, jobbers and manufacturers alike have comparatively small amounts of goods on hand. A replenishing movement is inevitable.

The new building of the Trumbull Electric Mfg. Company, Plainville, Conn., just completed, will give floor space for automatic machinery for the manufacture of steel armored electric cable.

The Rockwood Sprinkler Company, Worcester, Mass., is about to put in the foundations for an additional building, the completion of which will probably be deferred until next spring. The structure will be 114 x 244 ft., two stories and basement. The first floor and basement will be used for the storage of pipe and fittings, and the second floor will be devoted to manufacturing.

The Excelsior Needle Company, Torrington, Conn., states that no new equipment will be required in connection with the new factory building, which was noted last week. The added floor area will be used as increased space to accommodate departments already established. The structure will be 52 x 353 ft., three stories.

The business of R. E. Kidder, Worcester, Mass., manufacturer of sawing machines, drawing tables, etc., who died recently, is being carried along as formerly, under the direction of the Worcester Trust Company, which is the trustee of the estate.

The Pickering Governor Company, Portland, Conn., is planning the erection of an additional machine shop this fall.

Chicago

CHICAGO, ILL., August 31, 1914.

No better index can be had of the interruption of trade relations than the flood of general inquiry being received by local manufacturers regarding their products and their facilities for delivery and shipment. A wholesale scramble for new connections on the part of middlemen and consumers, in Great Britain particularly, but also in other foreign countries, is in progress. Thus far, comparatively little in the way of definite orders has materialized in this market in iron and steel lines, but textile manufacturers and the industries supplying foodstuffs, particularly meat, are the recipients of rush orders of great size. Indirectly this will result in a call for equipment in other lines and some inquiry has been received by local machinery interests from domestic manufacturers of textiles. The direct domestic demand for machinery appears to be decreasing, the railroads are buying little or nothing, and general manufacturers are waiting for tangible evidence of the course the future is likely to take.

The General Chemical Company, Chicago, has had plans prepared for a two-story warehouse, 32 x 250 ft., to be erected at Hegewisch at a cost of $40,000.

Frank D. Chase, architect, 122 South Michigan avenue, Chicago, has completed plans for a one-story factory, 160 x 240 ft., to be erected at LaPorte, Ind., at a cost of $55,000.

The International Harvester Company is building a one-story factory, 60 x 120 ft., cost $18,000.

Swanson & Hanson, Chicago, are building a one-story garage, 64 x 177 ft., at 5006 North Clark street, to cost $12,000.

C. E. Wilder, 1034 Crosby street, Chicago, is building a five-story addition to his factory, 49 x 126 ft., to cost $48,000.

The Auto Pump & Machinery Mfg. Company, Chicago, has been incorporated with a capital stock of $50,000 to manufacture agricultural implements and pumps. The incorporators are Robert W. Schweickler, John W. Kaufman and S. C. Brynelsen, 2223 North Kildare avenue.

The Modern Auto Parts Company, Chicago, has been incorporated with a capital stock of $20,000 by W. R. Fetzer, E. A. Biggs and E. S. Carr, 69 West Washington street. It will manufacture automobile parts and gasoline engines and parts.

The Adjustable Ratchet Wrench Company, Chicago, has been incorporated with a capital stock of $2000 to manufacture machinery, tools, etc. The incorporators are Joseph Schwartz, Gertrude Schwartz and Anton T. Anderson, 1149 Austin avenue.

The Ideal Automobile Company, Chicago, has been incorporated with an initial capital stock of $1000 to manufacture and deal in machinery, automobile parts and accessories. Incorporators are Archie A. Gross, S. Abrahamson, Arthur C. Dunning and Leonard L. Cowan, 10 South LaSalle street.

The Boller Insulated Wire Company, Chicago, has been incorporated with a capital stock of $20,000 to manufacture and deal in motors, electrical appliances, wire machinery, etc. Peter Boller, 5349 Washington boulevard; William N. Boller and W. H. Bentley are the incorporators.

Fire destroyed one of the buildings of the plant of the Midland Automobile Company, East Moline, Ill.

The McKinley Tractor Company will erect a plant at Belleville, Ill.

The factory of the William F. Jobbins Chemical Company, Aurora, Ill., was destroyed by fire with a loss of $200,000.

The Malleable Iron Company, Danville, Ill., will install a new furnace which will double its output of castings.

The Central Illinois Utilities Company, Paxton, Ill., states that the report that it is installing a 15-hp. turbine in its Gibson City station is incorrect. The company is, however, installing additional capacity at its station in Watseka, Ill. L. N. Boiun is vice-president.

The Galesburg Writing Machine Company, Galesburg, Ill., states that the report that it planned to move to Springfield, Ohio, is premature. The company has now made arrangements to remain in Galesburg. H. A. Bates is president.

The Krenkle Furniture Mfg. Company, Mackinaw, Ill., has increased its capital from $7500 to $15,000 and will add wood-working machinery.

The Bernardin Bottle Cap Company, Evansville, Ind., has had plans completed for a two-story addition, 40 x 87 ft., to its factory at Ingle street and First avenue. Clifford Shopbell & Co., are the architects.

The National Motor Vehicle Company, Indianapolis, Ind., states that it is now in a position to complete its building according to the plans first decided upon and expects to do so without regard to present financial conditions. L. S. French is in charge.

Kansas City, Kan., has authorized the expenditure of $60,000 on the extension of the pumping plant equipment and its electric light plant.

A quantity of machinery was ruined by fire at the Ajax Iron Works, Denver, Colo.

The Globe Elevator Company, Duluth, Minn., will rebuild that section of its elevator recently destroyed by fire. Extensive alterations will be made at the same time and several new pieces of machinery installed.

Fire destroyed the plant of the Adel Light & Power Company, Adel, Iowa.

The Humber-Anderson Mfg. Company, St. Paul and Minneapolis, Minn., will locate its factory for the manufacture of Little Oak tractors at Willmar, Minn. The company is capitalized at $500,000 and its name will be changed to the Willmar Tractor Mfg. Company.

Milwaukee

MILWAUKEE, WIS., August 31, 1914.

The August report of Milwaukee metal manufacturers will show a falling off in the volume of transactions as compared with the corresponding period of 1913, as have all previous months of this year. The market has been dull and dragging of late, but production has not yet suffered and pay-rolls are not reduced. No manufacturing additions are being made. Reports from points within the State are much more encouraging than those from the Milwaukee district. The European war influence is principally one of momentary mental depression rather than the actual loss of trade. Wisconsin and Milwaukee manufacturers, mainly manufacturers of iron and steel, have banded together to devise ways and means of capturing the trade of South and Central America to compensate for any loss in Europe and this effort is expected to act as a considerable stimulant to production.

The International Canning Machinery Company, Owen, Wis., has been organized with a capital stock of $250,000 by E. J. Vaudreuil, W. C. Tufts and Paul Phelps, to manufacture and market special machinery and equipment for fruit and vegetable canning and preserving establishments.

A report from Ashland, Wis., says the Cadillac Machinery Company, Cadillac, Mich., has received the contract for erecting and equipping a new primary house at the Ashland

plant of the Lake Superior Iron & Chemical Company, to replace structures destroyed last spring. The plant has been idle since the fire but will resume operations upon the completion of the new work, which will be about January 1, 1915.

The Felker Mfg. Company, Marshfield, Wis., manufacturer of galvanized iron and sheet metal products, is planning to build a factory to cost between $8000 and $10,000.

W. H. Hill, general contractor, Superior, Wis., has been awarded a $75,000 contract for machine shop, boiler house, residences and other buildings for a large mining interest at Chisholm, Minn.

Bids for the construction of the new $120,000 high and manual training school at Marinette, Wis., close September 4 with A. Z. White, secretary, school board. The architect is John D. Chubb, 109 North Dearborn street, Chicago.

All departments of the South street plant of the Western Malleables Company, Beaver Dam, Wis., are now in full operation. Partial operations were resumed in this shop on August 1 to relieve the capacity demand on the Center street foundry. The company owns two more plants in Beaver Dam, and expects to be able to man one of them before the middle of September.

The Bay Iron Works, Bayfield, Wis., is installing considerable new machine equipment, a freight elevator, and other apparatus in its automobile department.

The City Council, Rockton, Wis., has voted to close 160 ft. of Cottage street, to allow the Great Northern Mfg. Company to build its factory there. The company will manufacture a patented automobile wheel without pneumatic tires.

Detroit

DETROIT, MICH., August 31, 1914.

The present month has been an unsatisfactory one to the machinery trade from practically all viewpoints, and the total business transacted locally has been, to say the least, not impressive. The past week has been about on a par with the rest of the month; some business of course has been transacted, but there were no sales which aroused interest and the inquiry received was light. Competition is very keen and every prospect, no matter how unpromising, is being diligently followed up. The timidity of capital is strikingly illustrated in the lack of extensions to plants and equipment, and the extremely small number of new manufacturing ventures. Detroit manufacturers are showing great interest in the campaign to develop trade relations with South America and other new markets. Building permits show a decided decrease with practically no new industrial construction.

The Bennett-Dluge Company, Detroit, has been incorporated with a capital stock of $10,000 to manufacture soot blowers and other boiler appliances. The incorporators are James C. Bennett, Henry Weister and George A. Dluge.

The Detroit Steel Products Company, Detroit, is making plans for the building of an addition to its plant, 80 x 80 ft., to cost $7500. It will be devoted to the manufacture of automobile springs.

The McKenny-Devlin Company, Detroit, has been incorporated with $10,000 capital stock to conduct an automobile repair shop and to manufacture auto accessories. Paul R. McKenney, George A. and Lyle Devlin are the incorporators.

The Detroit Insulated Wire Company, Detroit, will erect a $6000 addition to its plant at 641 Wesson avenue. It will be 57 x 138 ft., one story.

The Moisture Proof Fibre Can Company, Detroit, has been incorporated with $12,000 capital stock to manufacture containers of various materials and machinery for the manufacture thereof. The incorporators include Thomas S. Neal, Rollin F. Neal and Albert O. Legrand.

The John W. Ladd Company, Saginaw, Mich., manufacturer of dairy and creamery supplies, has purchased a factory site in Detroit and will move its headquarters there. Albert Kahn, architect, is preparing the plans for the new factory.

Ambrose Beard & Son, jobbers in sheet steel, roofing tin, etc., who recently established offices in Detroit, have acquired an extensive show room and warehouse at 51-53-55 Woodbridge street, east.

The city of Albion, Mich., has voted favorably on a bond issue of $20,000, the proceeds of which will be used in improving the waterworks system.

Libby, McNeill & Libby, Chicago, will establish a modernly equipped canning factory at Coldwater, Mich. The plant will cost about $20,000.

The Board of Commerce, Flint, Mich., announces that the American Malleable Company, Lancaster, Pa., also operating a plant at Owosso, Mich., will build an additional plant at Flint. It is stated that plans for the new buildings are now being prepared.

J. J. Thorne, Bay City, Mich., has acquired the electric light plant of the Pinconning Light & Power Company at Pinconning, Mich. The new owner plans extensive improvements to the plant.

The Menominee Electric Mfg. Company, Menominee, Mich., manufacturer of electrical devices, will erect two additions to its plant. The principal addition will be used as a brass foundry.

The Western Michigan Steel Foundry Company, Muskegon, Mich., is in the market for an air or electric hoist and a number of air rammers.

Cleveland

CLEVELAND, OHIO, August 31, 1914.

The European war so far has had no beneficial effect on the machine tool trade and conditions in general manufacturing lines. The business uncertainty has caused some falling off in orders for various manufactured products. However, the feeling is very general that the war will cause a heavy demand for American manufactured products abroad and that a particularly profitable field will be developed for these products in South America. It is believed, however, that it will take several months to open up this South American trade. Manufacturers are going slow and closely watching the situation before taking definite steps to extend their foreign trade to the fields that have been supplied largely by German and English manufacturers. While machine tool builders do not look on the South American field as very promising owing to the limited amount of machinery used in those countries they expect to benefit materially from an improvement in the domestic demand if the looked for activity in foreign trade in manufactured products materializes. The present demand for machine tools is light. Some fairly good prospective orders have been held up because of the present unsettled conditions. One order has come from England for several turret machines and there are a few single tool inquiries for machines for export. There is an inquiry from China for ore handling equipment.

Building plans for four new garment factories in this city have been announced during the past few days. However, the erection of one or two of these plants may be deferred until conditions become more settled.

The General Specialty Company, Cleveland, has been incorporated with a capital stock of $20,000 to manufacture mechanical specialties. The incorporators are A. E. Hickley, John B. Earl, William H. Somers and others.

Bids will be received by the commissioner of purchases of the city of Cleveland, September 23 for three vertical triple expansion crank and flywheel pumping engines for the Division water pumping station. On September 10 bids will be received for a refrigerating plant for the city farms at Warrensville.

The Cleveland Railway Company, Cleveland, will erect seven buildings, including a truck repair and a motor repair shop. Orders for crane equipment have been placed and some machine tool equipment will be required.

The Cleveland Seating Company, Cleveland, has acquired a site in Collinwood, east of the city, where it plans to erect a plant that will include a main manufacturing building, 100 x 400 ft., and a power house. D. A. Grubb is manager.

The Superior Foundry Company, Cleveland, will build an addition to its plant.

Fire in the foundry of the Dunham Company, Berea, Ohio, August 26 caused a loss of about $25,000.

The Columbia Steel Company, Elyria, Ohio, will build an addition to its plant.

The Mohawk Rubber Company, Akron, Ohio, will enlarge its plant by the erection of two additions, one 61 x 100-ft., two stories high, and the other 31 x 56 ft., one story high.

The city of Akron, Ohio, has placed a contract with E. McShaffrey & Son for the erection of a sewage disposal plant.

The St. Marys Machine Company, St. Marys, Ohio, will move to St. Charles, Mo., where a factory building, 100 x 250, and a foundry, 60 x 150, will be provided.

The Maiwurm German Aluminum Company, Ashland, Ohio, is about to erect a factory 200 ft. square of saw-tooth construction.

The Beach Enameling Company, Coshocton, Ohio, will enlarge its plant by the erection of a 70 x 120-ft. addition to its main building and a 50 x 50-ft. addition to its machine shop.

The Auglaize Power Company, Defiance, Ohio, has been authorized to issue $666,000 of preferred stock to be sold to cover the erection of a hydroelectric plant and auxiliary steam reserve station, etc. W. P. Wallace is general manager.

The General Bronze Foundry Company, 4800 Hamilton avenue, Cleveland, Ohio, has increased its capital from $10,000 to $25,000. The present directors, formerly of the Aluminum Castings Company, Cleveland, include F. J. Mikat, president, and W. E. Weaver, manager.

Cincinnati

CINCINNATI, OHIO, August 31, 1914.

A generally better sentiment as to the business outlook is expressed by many manufacturers in different lines. While the machine tool trade is very dull, a rift in the clouds was brought about by the receipt of a fair sized order from Italy and two smaller ones from English customers. There was also a probable increase in the domestic business, although orders from this source are confined to single tools. It is currently reported that the railroads have about decided to make purchases covering part of their requirements, but this rumor cannot be verified. Wood-working machinery is slow, but there are a few orders from the South and West that are encouraging. Boiler and tank makers continue quite busy.

The jobbing foundries are still complaining, as the melt of iron is gradually decreasing, due to absence of orders from the machine tool and other manufacturers. No immediate improvement is anticipated, although there seems to be a general feeling that the tide will turn before the end of the year.

B. L. Baldwin & Co., Perin Building, Cincinnati, have completed plans for a one-story brick and steel power house for the municipal lighting plant at Henderson, Ky.

The Donaldson Lithographing Company, Covington, Ky., has let contract for a brick and concrete manufacturing building that will be 140 x 160 ft. and three stories high. Considerable special equipment will be required. Mention of this project was made some time ago. The new factory will be used for making metal signs and other specialties.

The Norwood Water & Light Company, Norwood, Ohio, has let the contract to the Heine Safety Boiler Company for additional boilers and stokers to be installed in its plant. The Laidlaw-Dunn Gordon Company secured the contract for a large air compressor.

The Jung Brewing Company, Cincinnati, contemplates making additions to its power plant equipment. Contract for the building has already been let.

The M. A. Hunt Company, Cincinnati, manufacturer of bed springs, will erect an addition to take care of its enamel and varnish departments.

The Cement Casket Mfg. Company, Albion, Mich., contemplates erecting a factory at Hamilton, Ohio. No details as to equipment wants are yet available.

It is rumored that the Maxwell Motor Company, Dayton, Ohio, is contemplating adding to its plant in order to take care of its increasing business.

It is reported that the Welsbach Company, Philadelphia, Pa., has decided to build a branch manufacturing plant at Columbus, Ohio. The company manufactures gas mantles and other specialties.

The Scioto Fire Brick Company, Portsmouth, Ohio, has decided to rebuild its plant at Sciotoville, Ohio, recently destroyed by fire.

The Heffner Milling Company, Circleville, Ohio, is establishing branch mills in different centers, and it is reported that Chillicothe, Ohio, has been selected as a site for a new mill.

The Xenia Rubber Mfg. Company, Xenia, Ohio, whose incorporation was recently mentioned, has completed plans for its new factory, and work is expected to commence at an early date.

The Cincinnati Locomotive & Car Works Company, Covington, Ky., has decided to rebuild its plant recently destroyed by fire. Machinery equipment wants are not yet known.

The Central South

LOUISVILLE, KY., August 31, 1914.

Somewhat better prospects are reported by a number of machinery houses, the situation having improved materially in regard to the number of inquiries since last week. On the other hand, it is stated that the ratio of inquiries to sales is much below normal, indicating that buyers are still uncertain as to future conditions, and are hesitating when it comes to the question of putting out their money for betterments or new enterprises. Manufacturers and dealers are encouraged by the greater number of prospects and are inclined to believe that business will be much better during the current month. The fact that financial and shipping arrangements have been made to take care of the Southern cotton is in itself a great relief to business in this section, and will doubtless stimulate buying. The demand is pretty well distributed over the entire line, no special item moving unusually well.

The United States Utilities Company, Louisville, incorporated with $60,000 capital stock, is having a steel yardage price computer made by contract at present; but will manufacture it later on. William T. Cosgrove is manager.

The Louisville Bridge & Iron Company, structural iron manufacturer, will be in the market shortly for motors aggregating several hundred hp. It has about decided to change its type of equipment from direct to alternating-current. F. H. Vaughan is president and general manager.

The J. V. Pilcher Mfg. Company, Louisville, metal specialty manufacturer, is reported to be in the market for a number of power crank drills, to be made according to the specifications of the company. J. V. Pilcher is president.

The Louisville Casket Company has been organized to continue the business of the Globe Casket Company, a Louisville wood-working concern, which recently went into bankruptcy. Louis Stoke is the manager and buyer.

The River Sand & Gravel Company, Owensboro, Ky., will need equipment for digging and handling river sand. The company has $10,000 capital stock. J. E. Delker may be addressed.

The American Metallic Packing Company, Lexington, Ky., is asking for prices on a used portable gasoline engine, 10 to 12-hp.

The Owensboro Shovel & Tool Company, Owensboro, Ky., has a contract for the manufacture of a gasoline motor cultivator patented by W. E. Franks and W. O. Hoskins. The latter plan to establish a factory later on.

Eskew Brothers, Marion, Ky., have established a machine shop and will handle boiler and machinery repairs.

R. E. Forman, Lexington, Ky., plans to manufacture a patented meat-cutting machine.

Obrecht Brothers, Tell City, Ind., will increase the capacity of their wood-working plant. Hubs and lawn swings comprise their line.

The McComb Supply Company, Jellico, Tenn., has been established and will handle machinery and supplies for coal mines and factories. H. B. McComb is buyer.

The Knox Stove Works, Knoxville, Tenn., will install equipment for nickel plating. Most of the machinery has been ordered.

The Union Iron Works, Nashville, Tenn., which was recently organized, will establish a stove foundry at Lewisburg, Tenn., to have a capacity of 150 stoves and ranges a day. John G. Cooke is secretary and treasurer.

The Maxwell Motor Company, Detroit, plans to establish a branch plant at Memphis, Tenn. It will be used for manufacturing light parts and for assembling work. A considerable amount of machinery will be needed. The building will be six stories, and with its equipment will cost $200,000. A site has already been leased. Vice-President Charles Gould is in charge of locating the branch, which will serve the Southern and Southwestern trade.

The Nashville, Chattanooga & St. Louis Railway, with general offices in Nashville, Tenn., will build a steel coaling station at Hollow Rock, Tenn. The estimated cost of the plant is $20,000. Power and conveying machinery will be purchased. H. McDonald, Nashville, is chief engineer.

The board of commissioners, Nashville, Tenn., will receive bids this week for the installation of one electric pump and tank at Compton avenue and Granny White pike. H. E. Howse is mayor.

The B. F. Sturtevant Company has the contract for the installation of a hot-blast heating system at the Buntyn, Tenn., roundhouse of the Southern Railway.

The King Reclining Swing Company, Memphis, Tenn., has increased its capitalization from $10,000 to $16,000 and changed its name to the King-Haase Furniture Company. Additional wood-working equipment is to be installed.

The Nashville Traction Company, Nashville, Tenn., which has been constructing lines there for some time, plans several suburban extensions which will require additional power facilities. W. O. Parmer is president.

The John G. Duncan Company, Knoxville, Tenn., machinery dealers, are in the market for several power mills to be used for grinding bone.

The Hamblen County Creamery Company, Morristown, Tenn., is equipping a large plant for the manufacture of butter and ice cream. Refrigerating and conveying equipment will be installed.

Birmingham

BIRMINGHAM, ALA., August 31, 1914.

The month of August was not a satisfactory one with machinery dealers. Outside of machine tools for a number of small factories building or about to resume autumn operations, dealings have been below normal. If the cotton crop is financed, business will pick up; if it is not, no improvement is expected for some time to come.

Lehlluis & Wilson, Kankakee, Ill., have bought the lumber plant of Fred Thornton, Knowlton, Ala., and will enlarge its capacity. Hickory wood is sawed there for Chicago consumption.

The city of Elba, Ala., will expend $5000 in the improvement of the waterworks plant. An electrically-operated centrifugal pump will be installed.

G. Ober & Sons, Baltimore, Md., have purchased a site at Savannah, Ga., and will build a fertilizer factory costing $10,000.

The Columbia Power Company, Columbia, Ala., has been organized by J. E. Foy, Columbia; Demot Shemwell, Lexington, S. C., and others, who propose to establish an electric lighting plant.

H. E. Barcus, Palatka, Fla., will establish a shingle mill. He has purchased 5,000,000 ft. of cypress timber.

The Potts-Wilson Frogless Switch Company, Ashburn, Ga., has been incorporated with a capital stock of $5000 and privilege to increase to $100,000. A plant is to be established.

It is announced at Savannah, Ga., that the Southern Seaboard Lumber Company will build one of the largest sawmill plants in the South following its purchase of the holdings of the South Georgia Lumber Company. The former company is capitalized at $3,000,000. Arthur F. McArthur is president.

Texas

AUSTIN, TEXAS, August 29, 1914.

The machinery and tool trade seems to be reviving from the temporary depression caused by the opening of hostilities in Europe. Preparations that are being made to provide for the holding of the cotton crop for an improvement in the market situation tend to create a spirit of optimism in business circles. The demand for machinery covers a wide range. Inquiries are now being received by Texas dealers from prospective purchasers in Mexico and if the political affairs of that country become well settled a large trade will be done there.

Plans are under consideration for doubling the capacity of the shops of the International & Great Northern Railroad at Taylor.

The plant of the Abilene Brick Company, Abilene, which was recently destroyed by fire, will be rebuilt.

J. J. Schuler, Houston, has purchased a site for a factory, for the manufacture of metal beds, which he will immediately proceed to build.

Charles Schreiner, Kerrville, will install new machinery in his cotton gin.

The city of Runge will construct a new waterworks system and electric light plant.

Thomas & Hester, Floresville, are building a plant for the manufacture of mattresses.

The Farmers' Cotton Oil Company, Celina, has increased its capital stock from $30,000 to $42,000 and will make improvements to its cotton-seed oil mill.

The Farmers' Gin Company, Rockwall, will construct a gin. William Nickels is one of the owners.

The Marshall Ice Company, Marshall, will double the capacity of its ice factory by installing additional machinery.

Preparations are being made for the construction of a municipal waterworks system and electric light plant at Roaring Springs. An ice factory will also be erected.

The Texas Power & Light Company, Austin, is building an electric power plant at Gainesville at a cost of $50,000.

The Lakewood Heights Company, Lakewood Heights, Dallas, is installing a waterworks system and a sewer system.

Bonds in the sum of $25,000 have been voted for the construction of a municipal waterworks plant and distributing system at Livingston. Browne & Wilder, Houston, prepared the plans.

At an election held August 25 the tax-payers of Corpus Christi voted to continue its ownership of the waterworks plant. An election will be held September 3 to vote on the question of issuing $300,000 of bonds for improving the waterworks system.

St. Louis

ST. LOUIS, MO., August 31, 1914.

The tone of the machine-tool market is improving slowly but steadily and there is increasing evidence of a resumption of business which has been at a standstill since the outbreak of the European war. A very slight increase in transactions has taken place, but the interest now being shown in machine tools, as evidenced by actual, though tentative inquiries, leads to additional optimism on the part of dealers who have not lost the belief from the beginning that with the adjustment of financial conditions there would be activity in the market. Plans have progressed at this point for the immediate use of cotton warehouse receipts in lieu of cash and this will have an important bearing, as a large part of the trade of this city is with the cotton-producing sections. The warehousing arrangements are progressing also and it seems now but a short time will elapse until business begins to move in something like a normal manner.

The Groover Engine Company, St. Louis, has been incorporated with a capital stock of $12,000 by John C. Porter, Northampton, Mass., and Fred W. Morgan, William T. Farrell and W. C. Guels, St. Louis, to manufacture engines and other machinery.

The American Thermometer Company, St. Louis, has been incorporated with a capital stock of $30,000 by Charles D. Bolin, Charles Weisenfels and Paul U. Farley and will acquire the plant of the National Thermometer Company and move to new quarters acquired which will be increased in capacity to double its output.

Fire Department Chief Frank E. Henderson, St. Louis, will prepare ordinances for introduction into the municipal assembly appropriating $1,000,000 for a high pressure system for the central part of the city together with hig'i service pumping apparatus therefor.

The Burchwell Mfg. Company, St. Louis, has been incorporated with a capital stock of $10,000 by L. H. Ferrell, William M. White and A. H. Burchard to manufacture tools, machinery, etc.

The Davis Creek Coal Company, St. Louis, has been incorporated with a capital stock of $75,000 by J. J. Wells and J. L. Rowland, Novinger, Mo.; L. L. Brande, Chicago, Ill.; E. H. Conrades and R. E. Rombauer, to operate coal mines and also to generate and distribute electricity for light and power.

The Mechanical Novelty & Mfg. Company, St. Louis, has increased its capital stock from $5000 to $20,000 for the purpose of increasing its manufacturing facilities.

The St. Louis Electrical Works, 5410 Easton avenue, St. Louis, of which S. A. Whitten is president, will equip at once for the manufacture of battery chargers, requiring at first a small power milling machine, punch press, shear, etc. It will manufacture about five a day to start with.

The New Florence Fire Brick Company, New Florence, Mo., has been incorporated with a capital stock of $30,000 by S. P. Adams, Howard Ellis and W. J. Gilbert and will build a plant.

The Zahringer Electric Light & Power Company, Pilot Grove, Mo., has plans for the immediate construction of an electric light and power plant, a franchise having been granted to the company.

The Ream Metal Bridging Company, Kansas City, Mo., has been incorporated with a capital stock of $30,000 by F. H. Ream, Frank H. Dorris and P. Beiler and will do metal fabrication.

The Buschow Lumber Company, Kansas City, Mo., has been incorporated with a capital stock of $150,000 by F. J. Buschow, W. M. Edwards and S. A. Wise and will establish mills.

The Liberal Stone & Brick Company, Kansas City, Mo., has been incorporated with a capital stock of $500,000 and will quarry stone, manufacture cement and mine clay for brick works.

The Diamond Plaster Company, Third and Michel streets, St. Joseph, Mo., has been incorporated with a capital stock of $50,000 by J. W. Keicher and others and will establish a plant with a capacity of 20 tons daily.

E. Shukert, 1113 McGee street, Kansas City, Mo., will erect a garage with repair plant and electric elevating equipment.

The Woodruff Ice Company, Peoria, Ill., has increased its capital stock from $5000 to $18,000 for the purpose of increasing its ice manufacturing equipment.

The East St. Louis Compress Company, East St. Louis, Ill., has plans for increasing its compress equipment by about one third.

The W. C. Ross Mfg. Company, Little Rock, Ark., has been incorporated with a capital stock of $50,000 by W. C. Ross, W. C. East, and others, and will equip to mine tripoli.

E. J. Hahn, Little Rock, Ark., is reported in the market for equipment in connection with a contract for excavation of about 600,000 cu. yd. of earth.

A franchise to install an electric light plant has been granted to John H. Pedan, Hot Springs, Ark., by the city of Glenwood. He is in the market for equipment.

The Marshall Roller Mill Company, Marshall, Ark., will equip an electric light plant.

The Little Rock Lumber & Mfg. Company, 417 Southern Trust Building, Little Rock, Ark., will equip an 8-ft. band mill with 40,000 ft. hardwood daily capacity.

At Sulphur Springs, Ark., C. G. Martin, Kansas City, Mo., will install about $10,000 of equipment for mining gravel.

The Central Heating & Mfg. Company, Little Rock, Ark., will change its equipment from hot water to steam at an expense of $53,000 and will later increase the new equipment to an ultimate cost of about $250,000.

The Minnequa Cooperage Company, Little Rock, Ark., will rebuild its boiler and pumping plant, recently burned with a loss of about $25,000.

The Caddo Mebane Cottonseed Company, Caddo, Okla., will install four 10-saw gins and other equipment.

Four 70-saw gin stands are to be installed in a cotton ginnery at Madill, Okla., by Linn & Burpo.

The Mater Electric Company, Guthrie, Okla., has been selected to install an electric light and power system at McLoud, Okla., with the Benham Engineering Company, Oklahoma City, Okla., supervising.

An ice plant of undetermined capacity will be installed at Ringling, Okla., by the Ardmore Ice Company, of which Burt Foster, Ardmore, Okla., is president.

F. R. Birdsall, Yazoo City, Miss., is in the market for equipment for forming boll weevil pans, metal-shaping apparatus being contemplated.

A two-story garage, with repair plant, etc., will be built and equipped at Meridian, Miss., by the Marty Foundry Company, for a client.

Donald Despin, P. M. Lawrence and S. W. Harris, Alexandria, La., will equip a creamery plant to cost about $6000, including power plant.

The city of Shreveport, La., has voted a bond issue of $1,250,000 with which it will equip a waterworks plant if the existing plant cannot be bought at a reasonable price. In the latter case the old plant will be considerably remodelled.

The Louisiana Railway, Light & Power Company, Thibodaux, La., which H. S. Smith and others are financing, will erect a power plant.

Morgan's Louisiana & Texas Railroad & Steamship Company, of which W. B. Scott, New Orleans and Houston, is president, will enlarge its Algiers, La., plant to repair and construct locomotives, at a cost of about $150,000.

The city of Plaquemine, La., will expend $42,000 upon the installation of a fire alarm system and the extension of its waterworks pumping plant.

The factory of the Crescent City Machine & Mfg. Company, New Orleans, La., is reported damaged about $8000 by fire. It will be replaced.

The cotton gin at Soper, Okla., owned by C. L. Webb, of Hugo, Okla., has been burned with a loss on equipment of $7000. It will be rebuilt.

The Pacific Northwest

SEATTLE, August 25, 1914.

New business is still held in abeyance, for the most part, owing to uncertainty regarding the foreign situation, though indications are becoming a little more favorable. The Pacific Ocean now appears to be fairly safe for the shipping of most nations, and some grain shipments are going out in British bottoms, while the regular Japanese liners are carrying the usual heavy tonnage, including large grain and flour shipments. The situation as to foreign exchange, however, seriously hampers export trade, and is causing some slight difficulty in local finances. Lumber mill operations have suffered a sharp curtailment, which is believed to be only temporary, as the Eastern trade via Panama is beginninng to open up. Holders of grain, canned salmon, etc., expect to get high prices for this year's output, which, if realized, will bring considerable prosperity to this district toward the end of the year.

The B. F. Sturtevant Company, Hyde Park, Mass., manufacturer of ventilating and heating supplies, will build a factory 100 x 200 ft., of concrete construction, in Seattle, to cost not less than $50,000. The company is represented locally by Ralph Chattam.

The Elbert Motor Car Company, Seattle, recently filed articles of incorporation to build cycle cars. L. H. Pemish, Vancouver, B. C., N. F. Wilson, San Francisco, Cal., and L. W. O'Connell, Chicago, Ill., are the principals. The designer and chief engineer of the factory is F. W. Topkin, formerly mechanical engineer for the Chicago Pneumatic Tube Company.

The Alaska Puget Sound Packing Company, Seattle, has been formed, with capital stock of $250,000, by John A. Frater, F. Smith Bent and Nicholas Rudeback, the incorporators.

The Franklin Tool Works, Seattle, has been incorporated for $5000, by W. C. Franklin, Harold J. M. Baker, and A. A. Oles.

Plans and specifications prepared by chief engineer Paul P. Whitham, of the Seattle port commission, for an apple storage warehouse to be erected on the East Waterway turning basin, have been approved and bids will be advertised to be opened September 23. The project will cost $500,000 and will include the building complete, with cold storage equipment, to be ready for operation by August of next year.

The Enterprise Sheet Metal Works, Inc., Billings, Mont., is having plans prepared for the erection of a brick shop 50 x 130 ft. one-story, and will equip it with machinery for the manufacture of furnaces.

The Witlatch Lumber Company's plant, Yelm, Wash., was destroyed by fire, with a loss of about $25,000. J. G. Startup and E. E. Witlatch, Yelm, are among the owners.

D. Jackson, president of the Southwestern Lumber Company, Enterprise, Ore., recently placed orders in Portland for a locomotive and a lot of rails. The company is also completing plans for a sawmill.

The Brinkley Supply Company, Seattle, has shipped equipment for seven plants to the Fish Cannery By-Products Company, Ward's Cove, Alaska.

The flouring mills, elevator and warehouse of the Imbler Flouring Mill Company, Imbler, Ore., were destroyed by fire recently, with a loss of about $125,000. The company will rush work on a new plant.

The Noble Metals Company, 2937 Sixteenth avenue, Southwest, Seattle, has leased a building and has fitted it with special equipment to do a metallurgical business. J. A. Comer is president.

Plans for the immediate rebuilding of the Bunker Shingle Mill Company, Centralia, Wash., recently destroyed by fire, are being prepared.

The sawmill of the Stanley Smith Lumber Company, Hood River, Ore., which was completely destroyed by fire recently, with a loss of approximately $120,000, will be rebuilt.

Harry H. Knox, Cordova, Alaska, has been granted a franchise for light and power plant by the City Council. It is stated work on the plant will start at once.

The shingle mill of Wagner & Wilson, Monroe, Wash., was damaged by fire recently. The machine shop and shingle kiln were destroyed.

The Freeland Furniture Company, Portland, Ore., will erect a furniture factory.

The sawmill plant of the Carlton Lumber Company, Carlton, Ore., was entirely burned recently, with a loss of about $50,000.

The Christian Farmers Elevator Company, Christian, Mont., has been formed, with a capital stock of $40,000. Carl W. Riddick, Samuel D. Rankin, John C. Kertz, are the incorporators.

The Ione Lumber & Pole Company, Spokane, Wash., has been incorporated for $20,000, by G. A. Rodgers and W. E. Front. Tolman & Kimball, 1112 Old National Bank Building, are the attorneys.

A certificate of public convenience and necessity has been granted to Dunkle Brothers, Plummer, Idaho, who will install an electric light and power plant.

The North Star Shingle Company, Arlington, Wash., has been incorporated by C. N. Benedict, Ole Torgenson and Levi Dow. A shingle mill will be erected.

Place & Donaldson, Fried, Mont., have practically completed arrangements for the construction of an electric light and power plant at Searchlight, Mont.

Leveque, Felsheim & Baverley, Bozeman, Mont., are completing plans for the establishment of a brick works.

The city of Coburg, Ore., has completed the purchase of the local water plant and will at once begin improvements.

Criddle-Fowler Power & Mfg. Company, Ft. Gaines, Ga., will build an ice factory.

The city of Boville, Idaho, will receive bids until September 4 for the construction of a water system to supply the city. It is estimated that the system will cost about $12,000.

Eastern Canada

TORONTO, ONT., August 29, 1914.

Plans have been drawn for the construction of a shipbuilding plant and drydock at Owen Sound, Ont., by E. D. Pitt, Victoria avenue, Niagara Falls, Ont. Cassius E. Gillette, Land Title Building, Philadelphia, is consulting engineer. The plant will cost $1,500,000.

The Brownsburg Furniture, Ltd., Argenteuil, Que., has been incorporated with a capital stock of $49,000 to manufacture furniture, etc.

The Woodstock Foundry, Ltd., Woodstock, N. B., has been incorporated with a capital stock of $40,000 to operate a foundry for the manufacture of iron, steel, etc.

Plans are being prepared by H. J. Glaubitz, City Hall, London, Ont., for the construction of two waterwheels, turbine pumps and synchronous motors and other accessories for the Springbank pumping station. The machinery will be installed next spring.

The Wilt Twist Drill Company of Canada, Ltd., has been incorporated with a capital stock of $144,000 to do business in Ontario. It has appointed Abraham D. Wilt, Walkerville, Ont., to be its attorney.

The Renfrew Machinery Company, Ltd., Renfrew, Ont., manufacturer of cream separators, etc., has increased its capital stock from $250,000 to $1,000,000.

J. E. Baechler, North street, Goderich, Ont., will make extensive additions to his building, to be used as a furniture factory.

The Canadian Top Company, Tilbury, Ont., will make additions to its factory. New machinery will be required.

The Shepard & Morse Lumber Company, Ottawa, Ont., lost its driving engine which was completely destroyed in an accident. An electric motor will be installed until a new steam engine can be put in.

The Toronto Hat Block Company, 24 Mercer street, Toronto, will build a two-story addition to its factory.

The City Council, Ottawa, Ont., is about to purchase an auxiliary electric pump which will be installed at the pumping station.

The Imperial Iron & Steel Company will erect a plant at Brampton, Ont. The building will be of reinforced concrete and brick construction and will cost $13,500. H. Westoby, Glasgow street, Guelph, Ont., is interested.

Wood & Miller, architects, Royal Insurance Building, Montreal, will call for tenders for extensive additions to be made to the plant of the Toilet Laundry Company, 425 Richmond street, to cost $75,000.

The report that F. C. Preston, Ltd., Haileybury, Ont., has been incorporated to manufacture steamboats, etc., is incorrect. The company is incorporated to carry on the business of a general store, etc.

The Field Lumber Company, Ltd., Field, Ont., has been incorporated with a capital stock of $50,000 by Z. Mageau, J. U. Lamarre, J. M. Cousineau, and others, to manufacture pulp, etc.

The Fibred-Asphalt Paving Company, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by M. T. Mathews, R. C. LeVesconte, V. J. Callen, and others, to manufacture paving material.

Dartmoor, Ltd., Toronto, has been incorporated with a capital stock of $162,000 by L. F. Black, H. A. Hall, W. B. Henderson, and others, to manufacture clay products, cement, stone, etc.

The Canadian Pur-O-Phone Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by J. E. Day, E. F. McDonald, A. C. Rutherford, and others, to manufacture talking machines, musical instruments, etc.

The International Distributing Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $10,000 by A. A. Tritsch, W. H. J. Tubb, M. Z. Pilon, and others, to manufacture safety razors, brushes, mirrors, etc.

The Marten-Freeman Company, Ltd., Toronto, has been incorporated with a capital stock of $200,000 by Thomas H. O. Marten, Arthur E. Freeman, J. L. Thorne, and others, to manufacture davits, cranes, etc.

The Anglo Canadian Construction Company, Ltd., North Bay, Ont., has been incorporated with a capital stock of $100,000 by James T. Lindsay, Robert L. Dudley, Harold R. Miles, and others, to build and operate saw mills, etc.

The Hermann Johnston Motors, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by George Ritchie, John G. Spears, George M. Proctor, and others, to manufacture motors and motor vehicles and all machinery used in their manufacture.

Arnold & Bell, Ltd., Sudbury, Ont., has been incorporated with a capital stock of $100,000 by W. J. Bell, J. P. Reid, G. J. Valin, and others, to manufacture pulp, paper, etc.

The Smart Mfg. Company, Brockville, Ont., will build a hardware manufacturing plant 100 x 150 ft., three stories and basement, to cost $50,000. Plans have been drawn by J. D. Denise, Olean, N. Y.

Leeks & Potts, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $40,000 by George A. Leeks, Hugh J. McKenna and others to manufacture glass products, paints, oils, etc.

The Austin Press, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Alfred H. Austin, F. P. Higgins, Robert Wherry and others to manufacture and deal in plant, machinery, etc.

The Attercliffe Standard Brick, Block & Tile Company, Ltd., Attercliffe Station, Ont., has been incorporated with a capital stock of $40,000 by Warren Stringer, John E. Moote, Thomas J. Kenny and others to manufacture brick, building blocks, tile and other clay products.

D. F. Hamlink, Goderich, Ont., plans to make large extensions to his plant. New machinery will be required.

The Lime & Agencies, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by James Stewart, William H. Latimer and others to manufacture brick, terra cotta, sewer pipe, pottery, etc.

Western Canada

WINNIPEG, MAN., August 26, 1914.

The Alberta Clay Products Company, Ltd., Medicine Hat, Alberta, states that owing to conditions in Canada brought on by the war in Europe, it does not plan to remain in operation and will make no extensions as it intended. R. P. Stewart is general manager.

The ratepayers of Edmonton, Alberta, have passed a by-law to grant $168,000 for electric railroad improvements.

The Dominion Harvester Company, Dauntless, Alberta, has started the construction of its plant. A large amount of machinery will be used.

The Canadian Mill & Product Company, Edmonton, Alberta, is being organized to establish flour mills, saw mills, trading posts, stores and elevators on the Peace River between Husdon's Hope and Ft. Vermilion, and in the Grande Prairie district.

The works of the Brick & Tile Company, Cloverdale, B. C., were destroyed by fire. The loss is estimated at $30,000.

The ratepayers of Calgary, Alberta, have passed a by-law to grant $80,000 for improvements to the waterworks plant.

The Wellington Lumber & Trust Company, Wellington, B. C., will erect a saw mill with a capacity of 200,000 ft. per 24 hours.

The Brackman-Ker Milling Company, New Westminster, B. C., will build a new plant to replace the one recently destroyed by fire.

The British Columbia Steel Works, recently incorporated, will erect rolling mills at Bridgeport, B. C. Francis L. Leighton, 519 Sixth street, Vancouver, B. C., is one of the owners.

The plant of the Pacific Coast Coal Mines Company, Wellington, B. C., was destroyed by fire recently. The sawmill of the Wellesley Lumber Company was also destroyed in the same blaze, with a total loss about $50,000. The owners state they will rebuild.

The Saskatchewan Co-operative Elevator Company, Regina, Sask., is calling for tenders for the erection of a building to cost $75,000.

The Pioneer Fire Clay Company, Ltd., Edmonton, Alberta, has been incorporated with a capital stock of $250,000 to manufacture brick, terra cotta, etc. It will erect a factory.

Government Purchases

WASHINGTON, D. C., August 31, 1914.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until September 22, schedule 7237, for two 35-in. x 6-ft. bucket type turbine cutting machine for Newport; schedule 7241, for one oxy-acetylene cutting machine for Boston; schedule 7251, for one mechanically guided cutting machine for Brooklyn.

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until 11 a.m., September 26, for three 15-ton locomotive cranes for Charleston, S. C.

The Commanding Officer, Watertown Arsenal, Mass., will receive sealed proposals until noon, September 24, for furnishing one Norwalk single air compressor, cylinder 20 x 24, without leather belt, etc.

Trade Publications

Sand-Dryers.—Indiana Foundry Company, Indiana, Pa. Pamphlet. Calls attention to a sand drying stove, illustrated in *The Iron Age*, May 21, 1914, for use by factories, mills, railroad lines, etc. The special feature of the stove is that the wet sand is prevented from coming in contact with the hot furnace by an upright grating through which the sand will run as it dries. Illustrations of the dryer with the main parts marked and with views of the grating are given together with a brief table of dimensions.

Air Meter.—Kreutzberg Meter Company, 1111 City Hall Square Building, Chicago, Ill. Pamphlet. Refers to a high-pressure volumetric air meter designed for measuring the output of air compressors, the consumption of pneumatic tools, pipe line losses, etc. The meter can be placed in the pipe line easily and is readily removed after the desired test has been made. A line engraving showing the construction of the meter and a brief description of the way it operates are included. An illustrated description of the meter appeared in *The Iron Age*, May 21, 1914.

Centrifugal Pumps and Steam Turbines.—Alberger Pump & Condenser Company, 140 Cedar street, New York City. Catalogue E. Refers to a line of centrifugal pumps of the volute section type which are arranged for either horizontal or vertical operation with a discussion of their characteristics. The design and construction are gone into at some length with illustrations and brief descriptions of the several styles. The turbine which this company builds for driving centrifugal pumps is briefly described together with illustrations of it in use for this purpose. Mention is made of a line of feed and mine pumps and a number of views of installations are presented. A diagram showing the positions of the outlets of the pump is presented together with a number of dimension tables.

Seamless Steel Products.—Federal Pressed Steel Company, Milwaukee, Wis. Collections of blue prints. Refers to a line of seamless steel products, such as shells, tanks, tank heads, valve shells, filler nozzles and caps, sediment cups, tank spuds, special fittings and brake drums that can be supplied. Diagrams of the different products are presented together with tables of the several sizes.

Turbine-Driven Pumps.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Folder. Calls attention to a line of turbine-driven pumps for boiler feed and fire service, central stations, power houses, mines, contractors' work, general service, air washing, etc. A number of views of different units are presented together with data on the capacities and the pressure against which the pumps operate.

Springs.—Farist Steel Company, Bridgeport, Conn. Card. Devoted to a line of spiral and elliptic car springs, a number of which are shown. Mention is also made of some of the company's other lines which include hammered or rolled steel of all descriptions, steel forgings of all kinds and steel for tools and dies.

Hammer Drill, Vise and Emery Wheel Dresser.—Rock Island Mfg. Company, Rock Island, Ill. Three circulars. The first illustrates and describes a stationary vise for repair work of all kinds. Regular vise jaws for all kinds of machinists' and factory work are provided as well as a set of pipe jaws for holding pipes and rods. It is also possible to use the vise as an anvil. The second points out the advantages of using a hammer drill where it is desired to drill holes in concrete, brick or stone. The drill is operated by a crank and for each revolution six blows are struck by the hammer which drives directly on the drill. The third circular refers to an emery wheel dresser for truing, shaping and removing glaze from wheels while they are running. In all of the circulars views of the different appliances are given and in the case of the hammer drill there are a number of views showing it in use.

Pumping Machinery.—Leader Iron Works, Decatur, Ill. Bulletin F-1. Treats of a line of pumping machinery for operation by electric motors, gasoline engines and hand power. The gasoline engine units are designed for either deep or shallow well pumping, the power being transmitted directly through gears and there is a power pump for belt drive from the engine or from a lineshaft. The electric pump is intended for use where the vertical suction distance is not more than 20 ft. and is built in two sizes having capacities of 180 and 360 gal. per hr. Four of the several styles of hand power pump are illustrated and briefly described with condensed tables of specifications. Mention is made of an automatic electric controller for use with motor-driven pumps or air compressors.

Ammonia Purifier.—De La Vergne Machine Company, Foot of East 138th street, New York City. Bulletin No. 137. Describes an ammonia purifier which is designed to be installed in the ammonia suction line for continuous operation to trap off oil, water, scale, dirt or other foreign matter and to catch any unusual amount of returning ammonia liquid. A brief description of the construction and manner of operation are included together with views of the purifier in section and as installed.

Oil Engines.—Remington Oil Engine Company, 120 Broad street, New York City. Pamphlet. Illustrations and descriptive matter explain the operation of a line of stationary and marine oil engines using crude oil and kerosene as fuel. The stationary engines are designed for pumping, operating air compressors, dynamos and refrigerating machines, and for manufacturing and general service work. The different engines are illustrated with dimension diagrams and tables on the pages facing the halftone engravings. Instructions on the starting of the engine are included.

Speed Change Gears.—Waterbury Tool Company, Waterbury, Conn. Pamphlet. Presents a brief description of the methods of disassembling and assembling the hydraulic speed changing gear which was illustrated in *The Iron Age*, May 29, 1913. This gear produces the variation in the speed by the passage of oil from one end to the other, the speed, of course, being dependent upon the amount of oil handled. A number of line drawings with the various parts marked are included.

Roller Bearing Wheels.—Sanford-Day Iron Works, Knoxville, Tenn. Form No. 7803. Contains a brief description of a line of roller bearing wheels for mine cars. A number of views of the wheels assembled and separated into their various parts are given as well as views of trucks to which they have been applied. Tables of the sizes in which the wheels can be supplied are given and mention is made of several cases in which the amount of lubrication required has materially decreased by their use.

Hoisting Engines.—John F. Byers Machine Company, Ravenna, Ohio. Pamphlet. Relates to a line of single and double drum hoisting engines. The uses of the various engines and hoists are presented together with brief tables of the sizes in which they can be supplied. Mention is also made of a line of material elevators with wood and steel platforms and traveling derrick cars of the A and square frame types. Mention is also made of a line of parts and accessories such as mast bottoms, brackets, chains, blocks, etc.

Mine Car Dumping Cages and Wheels.—Helmick Foundry-Machine Company, Fairmont, W. Va. Three circulars. Two of these show an automatic dumping cage for mine cars in the dumping and receiving positions. The special advantage of this cage is that there is no overhead frame to the tipping platform which enables wider cars to be handled. The third circular contains an illustration with a brief description of a wheel for mine cars containing a reservoir for grease that is large enough to enable the wheel to run from two to four months without refilling.

Forging Machines.—National Machinery Company, Tiffin, Ohio. Forging machine talk No. 5. Contains a brief description of the arrangement employed for maintaining the alignment of the heading and gripping slides together with drawings of the old and new types used in the machines. In the new design the slide is of the suspended type with the bearings at the top where they are out of the way of scale and water and there are no bearings underneath the slide. In addition to the drawings illustrating the change in construction, there are engravings of the heading and gripping slides and a top view of the machine showing the sectional top liners of the heading slide and the wedge construction back of the side liners for the gripping and heading slides.

Gasoline Storage Tanks.—Hamburg Boiler Works, Hamburg, Pa. Circular. Calls attention to a line of gasoline storage outfits which are designed to be installed underground, the tank being buried outside of the building if desired. Special emphasis is laid upon the features of safety and economy and a list of the sizes in which these tanks are regularly carried in stock is given.

Storage Batteries.—Electric Storage Battery Company, Allegheny and Nineteenth streets, Philadelphia, Pa. Collection of bulletins. Deal with various types of storage batteries for electric railway service, central station and isolated lighting and power plants, switch and signal service, fire alarm, laboratory and small motor work. Descriptions of the batteries are given, the text being supplemented by a number of engravings of the various types of batteries and plates with tables of the various batteries that can be furnished.

Worm and Spiral Gears.—Hindley Gear Company, 1105 Frankford avenue, Philadelphia, Pa. Catalogue No. 5. Size, 7 x 9 in.; pages, 110. Treats of a line of worm, spiral, bevel and spur gears. Brief descriptions of the various gears are given together with a number of tables of the sizes in which they can be furnished. Illustrations of the applications of the company's worm gears to blooming mills, machine tools, the reduction of speed and for general service are presented. The tables of the sizes in which the various gears can be furnished are very complete, ranging from leads of 0.2068 to 44.8 in.